En Route Congestion

ER-1 Match Airspace Design to Demands

Several of the busiest sectors in the midwest and northeast United States run at or near saturation during the peak hours of the day. Distributing control of the high-demand area will reduce the chance of congestion. The distribution can be done by shifting complex airspace structures (such as holding areas) to less busy sectors, by creating additional sectors in the congested airspace, or by dynamically altering the assignment of controllers to work particular sets of traffic.

Key Dates

Initial Choke Point Sectors, En Route Smoothing & NRP Modifications	2001
LDR Casebook Dissemination	2001
Final Choke Point Sectors	2002
Initial North-South Re routes	2002
High Altitude Concept Demo	2003
Kansas City ARTCC	2003
Bay-to-Basin Redesign (California 03/04)	2004
Great Lakes Corridor (ZOB, ZMP, ZID, ZAU)	2006

ER-1 Solution Set

ER-1: Match Airspace Design to Demands

Design and manage en route airspace to accommodate complexity and congestion.

Background

The structure of en route airspace has stayed virtually the same for the last several decades. However, demands on this airspace have significantly increased. The number of aircraft has increased, as has the diversity in the performance and type of aircraft operating (e.g., regional jets). Programs such as the North American Route Program (NRP) and Free Flight have increased the number of aircraft flying off structured air routes. Holding areas for arrivals frequently create undesirable interactions with en route flows. In some cases, the interaction causes ground delays in order to manage increased volume in an already busy sector, and in other cases, it is a matter of contention for the same physical airspace, which results in vectoring. This holding (including no-notice holding) and the static structure of today's sectors have exacerbated congestion and complexity in the en route environment.

In the areas where congestion routinely occurs, the only means presently available to supplement current resources is to add additional sectors (through resectorization and restratification, e.g., split existing sectors). This requires floor space, sector equipment and spectrum to be available for this temporary resource. New methods for managing and applying needed resources to en route sectors are needed.

Ops Change Description

There are four approaches proposed to deliver the desired operational change in the design and management of en route airspace:

- ER-1.1: Move holding areas that affect en route flows.
- ER-1.2: Redesign en route airspace, including adding/adjusting sector size and shape or developing rerouting options to alleviate congestion and complexity.
- ER-1.3: Implement the High Altitude Airspace Redesign.
- ER-1.4: Apply limited dynamic sectorization techniques to better manage available resources.

With regard to holding areas, the desired operational change is to make holding for the major eastern metropolitan areas of New York, Philadelphia, and Washington DC less disruptive to surrounding transition and en route operations. In the near-term, as part of the National Airspace Redesign System Choke Points, procedural and traffic management approaches are being applied to deal with impacts in the Great Lakes Corridor. As part of the NY/NJ/PHL Redesign and the Potomac Consolidated TRACON Redesign, airspace changes to accommodate holding within terminal airspace are being explored. Terminal holding should facilitate more efficient management of holding patterns, by minimizing coordination between en route facilities (sometimes multiple centers) and the TRACON. (Please refer to the terminal airspace redesign efforts discussed in AD-3.3.)

Changes to the overall airspace structure, including addition of new sectors in the Northeast, Mid-Atlantic, and Great Lakes Corridor, have been proposed as a means for managing workload distribution. Initially, redesign efforts will focus on optimization of existing resources by splitting and restratifying sectors, potentially creating additional sectors. Later efforts will include larger scale redesign actions, including sectorization concepts that may increase sector size and result in consolidation in the number of sectors. Activities included in the National Airspace Redesign System Choke Points Program, Regional Airspace Projects, and High Altitude Concepts represent the airspace changes expected between 2001 and 2006.

With the ever-increasing dynamic nature of en route flows, airspace boundary flexibility is needed to support dynamic airspace management. Concepts surrounding dynamic sectorization include a range of options from limited to full elasticity of what are currently static sector boundaries. Research is on going to determine how much flexibility is warranted and feasible. In the near- and mid-term, this flexibility can be achieved through Limited Dynamic Sectorization (LDR). LDR can be accommodated within most of the current constraints of the NAS infrastructure (automation, communications, etc.). Center by center development of limited dynamic sector configurations (consisting of multiple plans for a single facility, i.e., an LDR "casebook"), allows the team to focus the resources where the congestion exists by selecting one of several plans. This dynamic allocation reduces the need for dedicated resources, and provides more options to manage congestion.

Benefit, Performance and Metrics

Decoupling Holding Areas:

- Ground delay programs for congestion due to holding for a TRACON or Airport Demand imbalance should be reduced in number.
- Ground stop programs for congestion due to holding for a TRACON or Airport Demand imbalance should be reduced in number.
- Performance improvements will be based on the variance of scheduled throughput against actual for flows to cities whose arrivals have been identified as receiving unpredictable en route delays due to holding for a specific airport or TRACON.
- Performance improvement is measured by decreases in estimated time en route for flights to cities with arrivals that have been identified as receiving predictable en route delays due to holding for a specific airport or TRACON.

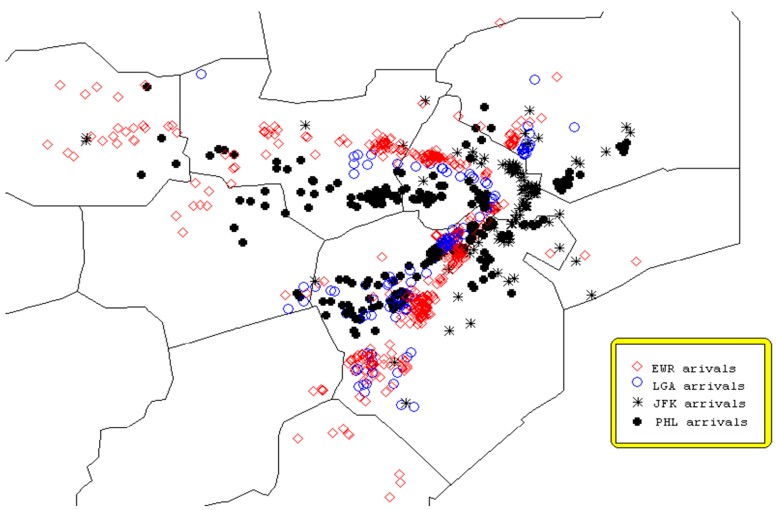
Sectorization, restratification, and reroutes:

- Ground delay programs for volume congestion should be reduced in number.
- Ground stop programs due to volume congestion should be reduced in number.
- Performance improvements based on the variance in scheduled throughput against actual for flows to cities whose arrivals have been identified as receiving unpredictable en route delays due to volume congestion a sector or set of sectors.
- Performance improvement is measured by decreases in estimated time en route for flights to cities with arrivals that have been identified as receiving predictable en route delays due to volume congestion a sector or set of sectors.
- Restrictions used to manage sector complexity and congestion should be reduced

Limited Dynamic Sectorization:

- By dynamically balancing traffic flows, complexity should be more manageable resulting in increases in sector throughput rates.
- Restrictions used to manage sector complexity and congestion should be reduced by using LDR.

ER-1.1 Move Holding for Washington, NY Airports and PHL



Airborne Holding Locations for EWR, LGA, JFK, PHL (VFR days, April 1999)

Scope and Applicability

- En route holding within the Great Lakes Corridor for New York and Philadelphia metropolitan airports has been identified as one of the National Airspace Redesign System Choke Points. Smoothing, Choke Point Action Item #16, is in process of operational evaluation. The concept of smoothing is three-fold: a change to NRP egress points, rerouting of aircraft through Canadian airspace, and application of traffic management procedures to alleviate complexity in en route airspace.
- In the mid-term, the Potomac Redesign project is examining airspace design alternatives that bring holding patterns for DC metropolitan airports into the Potomac Consolidated TRACON. The planned implementation for the PCT Redesign is 2003.
- In the long-term, the NY/NJ/PHL Redesign project is examining airspace design alternatives that bring holding patterns for the major New York airports under the control of NY TRACON (N90). The planned implementation for the NY/NJ/PHL Redesign is 2005/2006. Current alternatives are considering the use of terminal holding patterns.

Key Decisions

- None identified.

Key Risks

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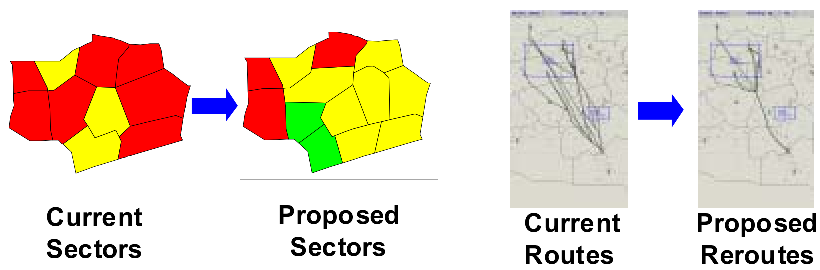
<u>Status of Key Milestones</u>

- NRP Modifications and Smoothing initiatives, which are part of the Choke Points Action Items, have been completed. Smoothing techniques are being applied in Chicago Center. The NRP Modification evaluation started in January 2001. NRP ingress and egress points were adjusted to Iowa City, and use of these traffic management initiatives are discussed daily as part of the Strategic Planning Teleconference. To date, more structured flows have increased sector throughput & helped decrease complexity.
- Rerouting aircraft through Canadian airspace is used routinely as a viable offload alternative during peak traffic periods

ER-1.2 En Route Airspace Optimization and Redesign



Scope and Applicability

The optimization and redesign of en route airspace consists of two main concepts. The first involves changing the number or size or shape of the sectors in the en route airspace. The second involves adjusting existing routes or developing new routes through these sectors. These techniques can be applied separately or together to alleviate congestion and complexity in the en route airspace.

- In the near-term, 19 new sectors have been identified as part of the National Airspace Redesign System Choke Points Action Plan. These sectors are located in the en route and terminal facilities in New England, Eastern, and Great Lakes Regions and will be operational by mid 2002.
- In the mid- and long-term, en route restratification and resectorization is planned for all en route centers in the U.S. Redesign plans have scheduled evolutionary implementation of these airspace projects between 2002 and 2006, including Kansas City ARTCC in 2002, Oakland ARTCC and Los Angeles ARTCC in 2004, and Great Lakes Corridor centers in 2006.
- Rerouting is being used primarily east of the Mississippi to address complexity and congestion. In the near- and mid-term, reroutes are being used to address several of the System Choke Points in the Great Lakes Corridor and traffic flowing north-south between the Great Lakes and Northeast to Atlanta and Florida.

Key Decisions

- There are currently over 700 sectors in the NAS, with over 100 additional sectors under consideration. In the near- and mid-term adding or splitting sectors may be the only way to alleviate key areas of congestion in the en route airspace. Air Traffic needs to determine the right level of sectorization, if/when it will need to pursue a strategy to reduce the number of sectors (while addressing the concerns of increased complexity and congestion) and evaluate how evolving technologies can support the reduction of the number of sectors.

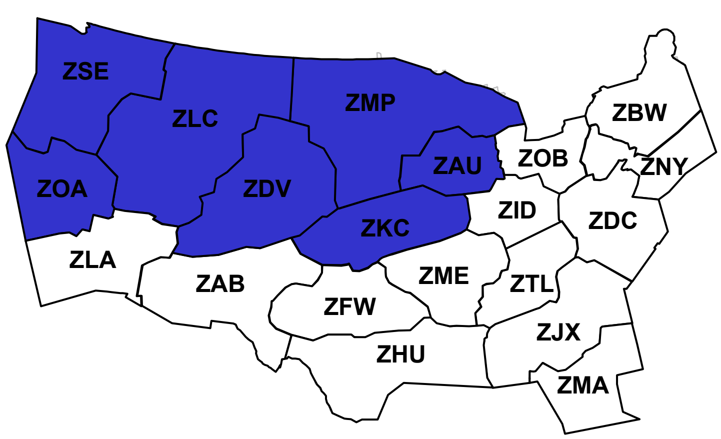
Key Risks

- Several infrastructure adjustments will be needed to support new sectors, including availability of building space, ATC automation, controller position equipment, and additional frequencies. Lack of availability of these systems may negatively impact the ability to transition to new sectorization or to implement additional sectors. Limitations of the current systems, specifically the HOST computer, will limit potential efficiency of some of the proposed airspace changes.
- VTABS (VSCS Training and Backup System) capacity is limited to 50 positions in each en route center. Upgrades and expansion are not available. There are no program requirements or funding to provide needed additional capacity. Currently no additional sectors can be added to ZAU (maxed out at 50 positions); ZOB is at 48 positions.

<u>Status of Key Milestones</u>

- Eleven Choke Points sectors implemented to date. To date, the implementation of these sectors, augmented with other choke points action items (e.g., NRP modifications) have resulted in the following benefits:
  - For Great Lakes area airports (CLE, ORD, DTW, MDW, PIT): departure (22%), arrival (27%), and block (22%) delays have been reduced from 2000 to 2001. Weather delays during this same time period did not change significantly.
  - Departure access for major airports in the Great Lakes Corridor (CVG, DTW, ORD) has improved. For departures from these key airports, departure (28%), arrival (31%) and block (27%) delay have decreased (weather delays during this same time period did not change significantly).

ER-1.3 Implement High Altitude Redesign



High Altitude Redesign – Phase 1

Scope and Applicability

The objective of the High Altitude Concept is to provide aviation users the greatest opportunity to operate on their preferred profiles and at efficient altitudes. When the High Altitude Airspace Concept is fully implemented, the FAA will utilize technology and airspace concepts/designs to provide the most efficient flight to aircraft operating in high altitude. The airspace will be designed to allow this flexibility with minimal constraints due to boundary conditions and maximum latitude for required maneuvers.

The High Altitude Concept uses an evolutionary implementation approach timed to match airspace design, adaptation, automation, and infrastructure development timelines. This approach capitalizes on available technologies to deliver early benefits while concurrently developing the longer-term requirements. These items include sector characteristics, alignment of the airspace with existing and/or new organizational structures, and cognitive and display requirements for modification to decision support tools.

In the mid-term, Phase 1 of the High Altitude Concept will implement as many operational changes for flexibility as possible within the constraints of the current automation and infrastructure. The airspace will be designed to provide the maximum utilization of point-to-point navigation given these constraints. To achieve desired flexibility the airspace will be designed for RVSM operations. RNAV routing for the high altitude will be designed to most efficiently accommodate the transition to high-density terminals and to support the avoidance of active special use airspace.

In the long-term, later phases of the High Altitude Concept may incorporate procedural separation on closely space routes, full domestic RVSM (see ER4), and required time of arrival for transition into en route and terminal airspace.

Phase 1 encompasses an initial implementation with a seven-centers planned for early 2003. This area provides all the characteristics required to evaluate initial changes in procedures and airspace designs. This airspace includes major city pair flows that include high altitude cruise as well as transitioning aircraft from ocean tracks. During the initial implementation, a decision will be made on the most effective next step. That is, whether to proceed by first extending the procedures and designs to lower altitudes within the seven centers or extending procedures and designs across all 20 centers.

In preparation for later phases, validation and requirements activities will be conducted concurrently with Phase 1. This activity includes the analysis and engineering studies needed to develop requirements for automation, infrastructure, procedures, sector design, and organizational alternatives (including staffing requirements, team dynamics, sector team composition) to achieve the full objectives of the High Altitude Concept. The best characteristics for high altitude sectors and related organizational structures will be developed and evaluated against current and forecast traffic characteristics, opportunities afforded by improved airborne and ground based technologies, and potential improvements in decision support tools.

Key Decisions

Phase 1:

- The FAA and user community need to determine if the airspace designated for the High Altitude Airspace operations will be exclusionary and mandate equipage levels. If exclusionary airspace is identified, transition paths will need to be developed to accommodate non-equipped users.
- Users will require access to information on SUA scheduling and usage to allow them to define and file optimal trajectories. This includes information on ATCAA usage. SAMS will be the primary mechanism to provide the data. Procedures and mechanisms for public access to the data are being developed.

Later Phases:

- The FAA needs to establish the expansion plans for the High Altitude Concept (when to expand to lower altitudes and beyond the initial seven-centers), including the final altitude floor for the High Altitude Concept.
- If the decision is made for mandated equipage or exclusionary airspace use, rulemaking will be needed.
- Adoption of a uniform grid naming convention and its inclusion into the en route adaptation will be needed. This grid naming convention provides a rich uniform net of fixes to support user development of RNAV profile, clear minimal change clearances for required controller intervention and a robust procedural backup to automation failures.
- The FAA needs to determine sector characteristics (size, team composition, communication and automation requirements, etc.) to provide the most efficient individual flights and flow in high altitude cruise.
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- The FAA should decide on the appropriate facility structure (number and size of en route facilities) to effectively support the High Altitude Concept, including management of the staffing, training, automation, displays and infrastructure to support the sectorization.

Key Risks

- Charting and real-time management of all forms of airspace usage (i.e., ATCAAs) is needed to support development of user-preferred routing that require minimal controller intervention.
- Funding for operational positions (overtime in the short-term) and ability to hire controllers for new positions will impact ability to implement the concept.
- Several infrastructure adjustments may be needed to support new sectors. Availability of these systems may impact the ability to transition to implement concept:

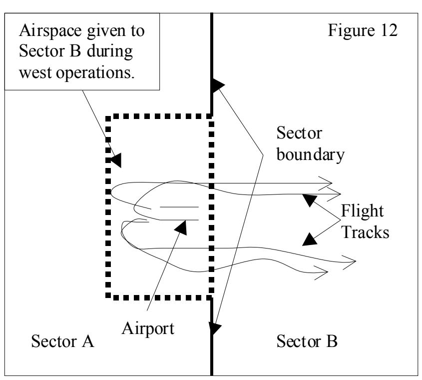
– ATC Host/ERAM automation.

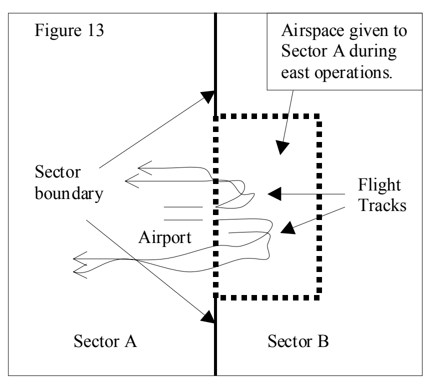
– Frequencies for transitioning and new sectors; enlarging sectors would affect the ground communications infrastructure. Existing radio sites may not provide adequate coverage for the larger sectors, so two or more sites containing radios operating on the same frequency may be required.

– There may be a need to modify surveillance linkages, and existing ground automation systems may not be capable of accepting additional inputs. Other infrastructure considerations include system adaptation and the possible use of new coordinate systems.

- Controller automation aids (e.g., URET, CRCT, TMA) may be needed to support the non-restrictive routing and transitioning to and from High Altitude airspace.

ER-1.4 Multiple Sector Configurations





Scope and Applicability

Airspace boundary flexibility in the near- and mid-term can be achieved by leveraging the limited flexibility that already exists in the system. Many facilities have found ways to support a limited form of dynamic sectorization within the constraints of current automation. These strategies that are feasible without modifying the current automation system are referred to as Limited Dynamic Resectorization (LDR).

Several en route centers apply LDR to address equipment outage (ZMA), weather (ZJX), special use airspace (ZJX), airport configuration change (ZTL), traffic volume (ZMP), and oceanic track change (ZOA). The LDR Casebook has been developed using these centers as examples of LDR application. The casebook has been distributed to all 20 ARTCCs with expectations of proliferating LDR concepts within the near- and mid-term time frames.

Key Decisions

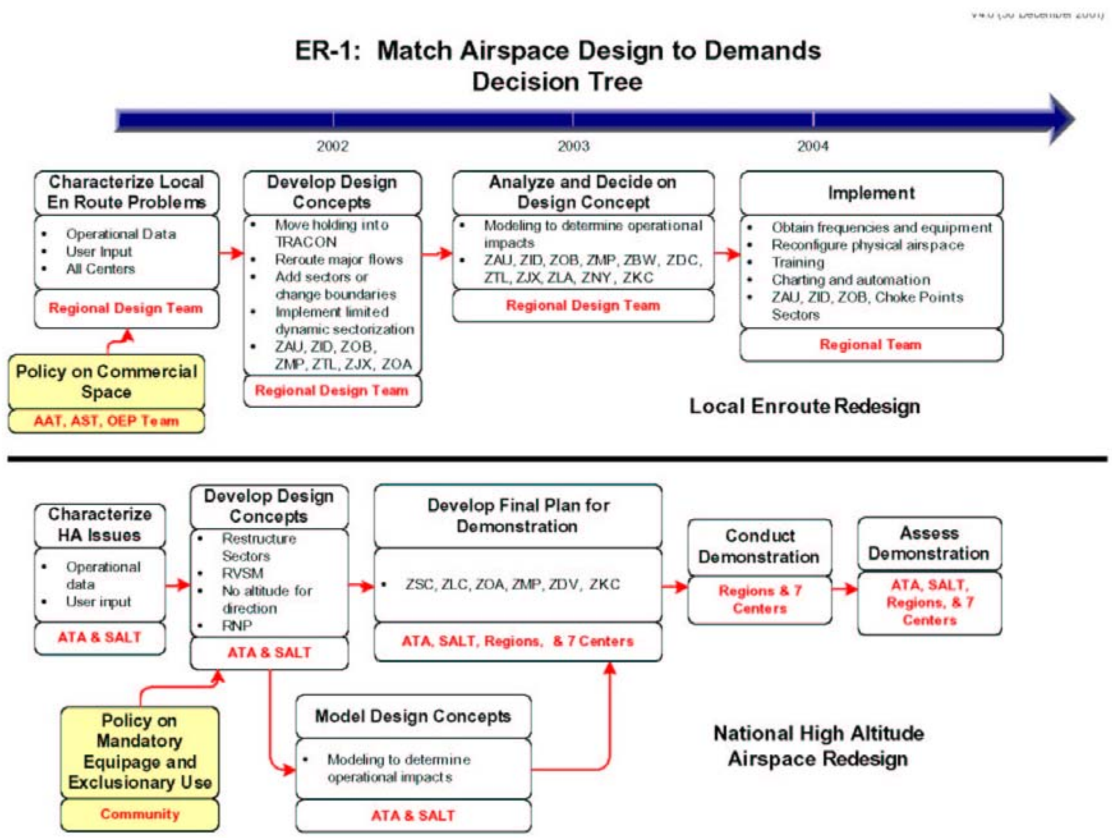
Key Risks

- None identified.

Status of Key Milestones

- December 2000 completed Limited Dynamic Sectorization Casebook, distributed to all regions and en route facilities. Workshop held to promote use of LDR and share knowledge, experience and expertise among facilities.

ER-1 Decision Tree



ER-1 Responsible Team

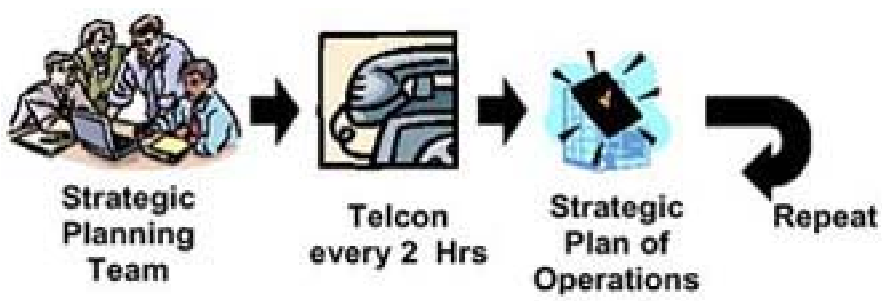
Primary Office of Delivery
Sabra Kaulia, ATA-1

Support Offices
Regional Air Traffic Managers
Regional Air Traffic Airspace and Operations Managers
Regional Airspace Focus Leadership Teams
Facility Airspace Design Teams
ATP-1
ATT-1
AUA-200

ER-1 Links To Architecture

Air Traffic Services / Airspace Management / Airspace Design
108101 - Current Airspace Design
108106 - Flexible Airspace Management

ER-2 Collaborate to Manage Congestion



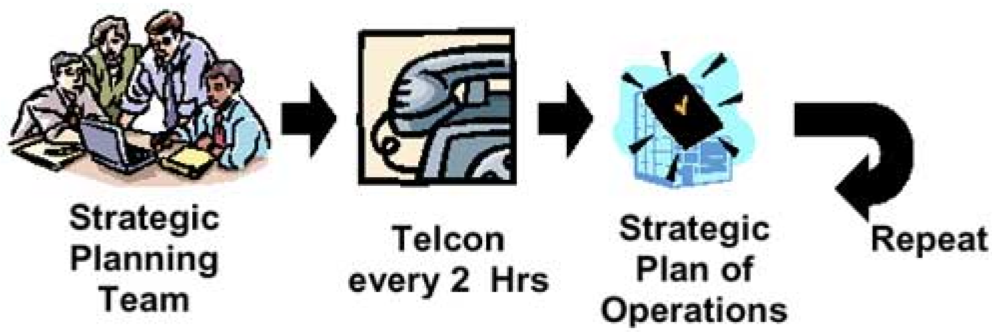
Congestion may appear for brief periods of time at non-routine locations or at different hours of the day. Such congestion may be avoided by sharing predictions with users and allowing them to plan accordingly. Coordination of a game-plan for likely events is done ahead of time to ensure an effective response. Based on results from the collaborative process used for the severe weather season of spring/summer 2000, a program of training has been implemented to prepare controllers, pilots, and airline dispatchers for the spring/summer 2001 activity. Collaborative decision making and information sharing will continue to be emphasized to respond to en route congestion.

Key Dates

Operational Rules and Process Changes (Annual Cycle)	2001
Train Personnel and Implement Recommendations (Annual Cycle)	2002

ER-2 Solution Set

ER-2: Collaborate to Manage Congestion



Congestion may appear for brief periods of time at non-routine locations or at different hours of the day. Sharing predictions with users and allowing them to plan accordingly may avoid such congestion. Coordination of a game plan for likely events is done ahead of time to ensure an effective response. Based on results from the collaborative process used for the severe weather season of spring/summer 2000, a collaboratively developed training program was implemented for the spring/summer 2001, which prepared controllers, pilots, and airline dispatchers to manage the congestion systemically. Collaborative decision making and information sharing will continue to be emphasized in response to enroute congestion for 2002.

Key Dates

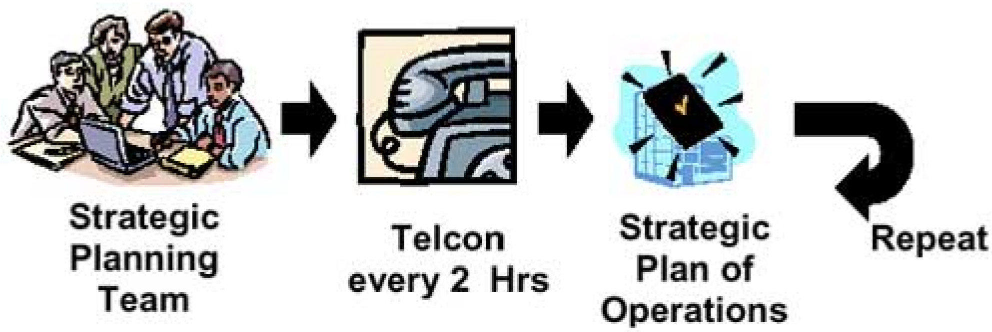
Operational Rules and Process Changes (Annual Cycle) 2002

Recurrent Training, focused on technical, process or procedural changes (Annual Cycle) 2002

ER-2: Collaborate to Manage Congestion

Processes, procedures and techniques to collaboratively mitigate en route congestion.

Background



Certain areas of the national airspace system (NAS), such as Chicago to the northeastern U.S. corridor and others east of the Mississippi River, are highly complex and geographically limited. Overall increases in airspace demand, and significant increases during peak demand periods routinely lead to congestion, which can have a ripple effect throughout the NAS, even under the best conditions. These situations (similar to severe thunderstrom situations) require a system wide choreographed effort to minimize service disruption. The Strategic Planning Team (SPT) process, launched by the Spring/Summer 2000 initiative, was designed to foster the effort.

The SPT conducts a telcon among the major facilities and the user community every two hours to discuss the status of the system, constraint projection, and to develop the Strategic Plan of Operations (SPO). The SPO is a collaborative agreement on how to deal with severe weather and other flow constraints and to provide a degree of predictability for all stakeholders by providing a common view of system issues with a look ahead of two to four hours. The spring of 2000 was the inaugural year for the SPT/SPO process. Significant progress was made during the severe weather season of 2000, however issues remain and improvements can be made. For example, increasing specificity in the strategic plan, finding balance in meeting stakeholder objectives, reducing the need for tactical initiatives through improved planning, extending the feedback mechanism to capture front line employees including controllers, pilots and airline dispatchers, improving communication methods, and improving technology.

Ops Change Description

Operational changes will be seen as a continuous improvement to the strategic planning process and system predictability. There will be increased collaboration and greater common situational awareness by utilization of new technologies, such as the Flow Evaluation Area (FEA) and Flow Constrained Area (FCA). FEA/FCA functions available to Traffic Management Units (TMUs) on the Traffic Situation Displays (TSD). The NAS user likewise will access and discuss public FCAs through the use of the Common Constraint Situation Display (CCSD), which provides limited web based access to the Enhanced Traffic Management System (ETMS). Enhancements and greater distribution of the Flight Schedule Monitor (FSM) will provide airport traffic demand and capacity maximization capabilities. Improvements in Ground Delay Programs (GDP) functionality and refinement of ground stop (GS) procedures in conjunction with

FEA/FCA functionality will provide alternatives to collaboratively manage severe weather constraints in the en-route environment. Communication sharing methods, such as the Traffic Management National Log (TMNL), the ATCSCC web site, the CCSD, and the Web Situation Display (WSD) will enhance collaboration for both internal and external traffic managers.

Other operational changes will include process and procedure as identified through analysis, feedback and review, including integration of new technologies, as they are made available to the traffic managers. Yearly training will play an integral role for ensuring success of the solution. In addition, the Traffic Flow Management (TFM) system will undergo a modernization effort that will improve the timely identification of constraints, access to this information by the user community, and improved collaboration and execution mechanisms that will greatly enhance the implementation of TFM initiatives.

The operational changes are evolutionary and thus will span the entire timeframe of near, middle, and long term (2001-2010) and most likely beyond as well. The following sections address the operational changes described.

- ER-2.1: Improved collaboration and communication through shared information.
- ER-2.2: Menu of enhanced pre-planned options.
- ER-2.3: Technology: improved predictability of congestion and resolution assessment
- ER-2.4: Training: Expansion of Joint FAA/Airline Initial Training, Recurrent Training, and Analysis

Benefit, Performance and Metrics [suggested data source]

- Increase on-time arrival rate. [Department of Transportation statistics]
- Increase on-time departure rate. [OPSNET, Aviation System Performance Metrics (ASPM)]
- Decrease excess taxi times (> 1 hour). [ASPM]
- Reduce the number and/or duration of ground delay programs due to volume congestion. [Flight Schedule Analyzer (FSA), ATCSCC logs]
- Reduce the number and/or duration of ground stops due to volume congestion. [FSA, ATCSCC logs]
- Decrease the variance in scheduled throughput against actual. [ASPM, OPSNET]
- Decrease estimated time en route. [ASPM]
- Decrease minutes of en route delay. [ASPM, OPSNET]
- Increased predictability of the NAS as indicated by increase in flown as filed. [POET]
- Decrease airborne holding [ATCSCC holding reports]

ER-2.1: Improved Collaboration and Communication through Shared Information on FAA/NAS Users Plans and Constraints

Scope and Applicability

Near Term:

ATCSCC WEB:

The information provided on the ATCSCC web site (internet based information dissemination system that provides NAS information) will be updated to provide timely NAS status data with the greatest clarity possible, including information needed for the strategic planning process. (Under continual review)

Accomplishments:

- Diversion Recovery Tool (DRT): Entered prototype use 6/01.
- Previous Strategic Plan of Operation added to ATCSCC web site (Summer 01).
- Aviation System Performance Metrics (ASPM) expanded 34 airports (8/1/01):

ATL	DFW	LAS	ORD	STL
BOS	DTW	LAX	PHL	TPA
BWI	EWR	LGA	PHX	
CLE	FLL	MCO	PIT	
CLT	HNL	MDW	SAN	
CVG	IAD	MEM	SEA	
DCA	IAH	MIA	SFO	
DEN	JFK	MSP	SLC	

Traffic Situation Display (TSD)

The TSD is a sub-system of the Enhanced Traffic Management System (ETMS), which provides NAS information, constraint information (monitor alert parameters (MAP), FEA/FCA), flight data, and weather radar to the ATCSCC, and field facilities.

Note: ETMS is a flight data processing and distribution system that utilizes historical flight routings, flight intent information, and actual aircraft position.

- The Enroute Working Group report supports this through a recommendation to continue development of a Flight Plan Pre Processor (FP^3) prototype. (11/01)
- Additional tests of FEA/FCA are planned.

Accomplishments:

- Flow Evaluation Area (FEA)/ Flow Constrained Area (FCA) functionality has been deployed on the TSD. Users access will be provided through the CCSD.
- CCSD (without FCA) published on ADTN and CDMnet (6/29)
- Phase 1 of FCA deployed 6/18/01. Remote patch 7.2.7 entered 8/7/01.
- Live Test of FEA/FCA conducted with airlines 11/01
- RVR expanded to 42 airports (11/30/01)

ATL	DCA	HOU	MIA	RDU
BFI	DEN	IAD	MSP	SAN
BOS	DFA (DFW	IAH	OAK	SEA
BUR	east)	IND	ONT	SFO
BWI	DFB (DFW	LAX	ORD	SJC
CLE	west)	LGB	PDX	SLC
CLT	DPA	MC0	PHL	SNA
CVG	DTW	MDW	PHW	STL
DAL	GJT	MEM	PIT	TPA

Traffic Management National Log (TMNL)

The FAA's Traffic Management National Log (TMNL) program (an intra FAA Air Traffic Services computer based communications and reporting system for controllers and traffic management personnel to record and distribute daily operational information) will provide a more efficient method of capturing and disseminating information on restrictions (e.g., airport runway configuration changes can be entered and effected facilities addressed for notification).

- TMNL deployed at 7 beta sites (9/5/01).
- TMNL Version 1.22, Enhancements to the viability of the restriction process (scheduled 2/02)
- TMNL expansion to most ARTCC's planned for Spring 2002

Collaborative Decision Making network (CDMnet)

Users systems such as the Collaborative Decision Making Network (CDMNet) (a collective network routed through the Volpe Center providing two-way real-time operational data exchange such as cancellation information and NAS status) is continuing to be expanded for better data quality and increased user participation to enhance system demand predictability.

- Simplified Substitution Rules (SSR) deployed 5/01.

S2K+1 Improvements

Spring/Summer 2001 (S2K +1) process improvements are completed including:

- Collaborative S2K +1 field training (Remove, Covered in ER 2.4)
- 24-hour SPT/severe weather unit staffing.
  SPT scheduled for 24-hour coverage 5 days per week (4/01)
  Seven-day per week coverage will begin 4/02.
- Pre SPT checklist usage.
  A Pre-SPT checklist and other methods were evaluated and tested. The evaluation determined that the previous SPO was the best starting point to prepare for the next TELCON. The current and previous SPO are now published on the ATCSCC web site.
- Increased staffing levels at FAA field facilities.
  A budget request has been made for 95 additional traffic management personnel.
- Improved Pre/Post communication of the SPO.
  A "Stand-up" briefing has been instituted to occur at 8:00AM and 4:15PM daily at the ATCSCC. Participants include Operational Management, Weather Unit personnel, ATA, NBAA, and staff representatives. (4/01)
  Responsibilities and procedures for the Severe Weather Coordinator position have been refined to provide for improved communication (5/01).
  Initiating development of procedures for East/West coordinator position to improve internal communication (completion expected 1/02).
- Develop collaborative "rules of the road" procedures.
  The 2002 Enroute working group has developed recommendations for Flexible Rules for the Operation of the NAS During Severe Weather. Evaluation of the recommendations will be complete by Spring 2002.
- Collaborative Convective Forecast Product (CCFP) extended to 24-hour operation during severe weather season, March-April.

Mid-Term:

Enhanced Traffic Management System (ETMS) enhancements:

- Improved data quality:

  Improve ETMS data for predictability in order to make better traffic management decisions, for example implement an early intent filing process (three to four hour pre departure).

The Enroute Working Group report supports this through a recommendation to continue development of a Flight Plan Pre Processor (FP^3) prototype. (11/01)

- NAS status and constraints descriptions will be enhanced through updated versions of FEA/FCA functionality and based on user feedback. Integration of the CCSD and WSD is included for facilities and users needing web access. Collaborative Routing Coordination Tool (CRCT) re-route functionality will be incorporated into the ETMS. (CRCT is a prototype tool that utilizes aircraft trajectory modeling along with flight schedule information to produce "what if" decision support capabilities).

  ETMS 7.4, planned for March 2002, incorporates the following additional CRCT functionality:

  Time-in-FCA display

  Include FCA in TSD replay

Long-Term:

Traffic Flow Management Modernization:

- Interactive TFM through improved insight into airport conditions and departure queuing.
- Improved system impact assessment capability to evaluate TFM strategies and monitor progress towards selected initiative.
- Improved equity through common situation awareness, access to system constraint information and improved predictability in the system.

Data Quality:

- Continuous improvement of data provided by the FAA and NAS users for enhanced collaboration.
- ETMS 7.5, planned for October 2002, incorporates the following additional CRCT functionality:

  Initial routing functions (to be defined)

<u>Key Decisions</u>

- Data quality standards adopted (e.g., timely cancellation notification that will allow maximum utilization of available airport capacity).
- Data sharing parameters adopted (e.g., inclusion of GA flight intent as early as possible).
- Common metrics identified for operational analysis and problem identification.
- Common goals and targets adopted to achieve a "System Thinking" approach.
- Operating "rules of the road" adapted to foster equitability for user groups.
- Expanded authority of the FAA to enforce compliance when "gaming" of the system is identified.

Key Risks

- Access to data and information that is currently considered to be sensitive or company proprietary is at issue. There are security, company proprietary, and privacy restrictions on some of the information that has been requested for inclusion in the information exchange.
- The numbers of stakeholders (airspace users and FAA facilities) that need to be involved in the collaborative participation, due to incomplete intent data, the need for an agreed upon reduced en route capacity rationing process.
- Data sharing enhancements.
- Systems connectivity between stakeholders may not be fully established due to the diversity of stakeholder systems or operational environments (e.g., major air carriers AOC fully connected to decision support tools through the CDMNet versus a single business jet operator whose preflight information comes from an Fixed Base Operator (FBO) or DUATS).

ER-2.2: Menu of Enhanced Preplanned Options for Congestion Management

Scope and Applicability

Near, Mid-, and Long-Term

Coordination of route modifications in a timely manner was a high priority item going into the spring of 2000. The goal of reducing the time needed to express clearance changes over already congested voice frequencies necessitated abbreviating the clearances in a standardized and database adaptable format. The National Playbook, Coded Departure Routes (CDR), and low altitude programs (CAPing, Low Altitude Arrival and Departure Routes - LAADR) are identified ways of achieving this goal.

The Playbook and CDRs have been used successfully during congestion situations during the year 2000 and LAADR, while only used at St. Louis under an MOU between ZKC and TWA, has shown to be an effective program. Enhancement to these programs, such as, program expansion, and improved distribution is a continual process. Playbook and Coded Departure Routes are available on the ATCSCC web site and the CDM web site.

The National Playbook is scheduled for incorporation to ETMS version 7.4 (3/02)

Accomplishments:

Route Management Tool (RMT)/CDR:

CDR's are also available using the Route Management Tool (RMT) through ADTN and CDMnet.

FAA Notice 7210.507, Coded Departure Routes (effective 6/15/01), establishes procedures, responsibilities, process, and cycle. The process follows the standard 56-day publication cycle.

The RMT has been enhanced to include a graphical route depiction (6/01).

A preview of CDR's to be published is available 25-30 days prior to publication through the Route Management Tool or on the data disk distributed by the National Flight Data Center (NFDC).

More than 13,000 CDR's are available for use (12/01).

Playbook:

- Identify cycle and process for updating published, "plays". (Complete)

FAA Notice 7210.517, National Playbook (effective 12/18/01), establishes the procedures, responsibilities, process, and cycle for the National Playbook. The process follows the standard 56-day publication cycle.

The Playbook is currently on the 56-day update cycle on the ATCSCC web.

A total of 126 plays are included in the National Playbook (11/01).

- Post updates on the ATCSCC web site. (Complete)

A Preview version of the new Playbook is placed on the ATCSCC website 7-14 days prior to the publication date

- Altitude Programs:

LAADR agreement established between ZMP and NWA (5/01)

Five National Playbook Routes through Canada are being added with an effective date of 12/27/01.

Key Decisions

- Increase incorporation of pre-planned routes into flight planning systems and aircraft flight management systems (FMS).

Key Risks

- Dynamics of tactical real-time situations often require revision of pre-planned options.
- Improved coordination and communication when activating pre-planned options or changes to pre-planned options may require automation improvements to FAA/User systems.

ER-2.3: Technology: Improved Predictability of Congestion and Resolution Assessment

Scope and Applicability

The enhancements of existing decision support systems and the addition of new decision support systems (DSS) and/or tools will improve the timeliness, accuracy, and quality of congestion predictions and resolutions. In the near, mid, and long term, continuous improvement programs to increase predictability of congestion and provide quality resolution assessment are:

- The Web Situation Display (WSD), an web based version of the TSD:

  Available via the Intranet 10/00.

  Available via secure Internet to remote FAA and DOD users 8/01.

- Enhancements to the Collaborative Convective Forecast Product (CCFP) that will provide a more accurate view of long-term convective weather constraints.

  CCFP integration to the TSD planned for ETMS v7.4, 3/02. The function will provide traffic Managers a better ability to correlate the anticipated impact with the traffic prediction.

- Enhanced Traffic Management System (ETMS) upgrades (i.e. FCA functionality) which will better define airspace capacity reductions and support resolution capabilities.
  - ETMS version 7.2 Major Functionality
    - Phase 1 FCA deployed 6/01
    - Expanded Flight database deployed 5/01
    - Addition of Northern Hemisphere Winds information deployed 5/01
    - Addition of departure fix information deployed 5/01
    - RVR data available 5/01
  - FCA functionality integrated into ETMS version 7.3 (11/01)
    - Moving FCA (heading and velocity)
    - Flight filters*
    - NAS elements used to specify an FCA (e.g., sector, route)
    - Examine multiple FCAs at same time
    - Expanded ability to share FCA
SAVE and RECALL option for FCA
    - Delete expired FCAs automatically at night
    - Identify facility creating the FCA
Browse functions for FCA **
    - Delete multiple FCAs **
    - Initial routing functions
  - FCA functionality to be integrated into ETMS version 7.4 (3/02)
    - Show “entering flights” counts in bar chart and timeline
    - Time-in-FCA display
    - Include FCA in TSD replay

- Continued evaluation of the Collaborative Routing and Coordination Tool (CRCT) functionality to be transferred to the FCA tool.

  CRCT core team developed and recommended identified functionality transfer to ETMS (4/01)

- Complete full adaptation of the Departure Spacing Program (DSP) to assist in maximum delivery of aircraft from the terminal area.

  Expansion to the Boston and Washington metropolitan areas is planned for Fall 02.

- Improved capabilities and processes for Ground Delay Programs (GDP's) implemented in support of SWAP for en-route congestion.

  The Enroute Working Group recommendation encourages continued development of FSM capabilities for the enroute environment to be available Spring 2002.

Key Decisions

- Decision Support Systems (DSS) integration.
- Establish an Early Intent Program.
  Decide whether or not to continue development of the Flight Plan Pre Processor prototype.
- Quality of input data for strategic planning time horizons is highly variable. Improve data quality, access and usage will need to be revisited or established.

ER-2.4 Training: Expansion of Joint FAA/Airline Initial Training, Recurrent Training, and Analysis

Scope and Applicability

Near-, Mid-, and Long-Term

All participants in strategic planning for traffic flow management (Users and FAA) need to have common training on Traffic Flow Management (TFM) techniques, procedures, and processes. The following programs have begun prior to the Spring 2001 convective weather season and will be on going as part of a continuous improvement process. Development of the training program for 2002 will build off the successes of an integrated training concept employing development and delivery consistent with the collaborative approach. Work groups have begun this process in June 2001 for the spring 2002 time frame.

- Accomplishments:

  Completed Collaborative S2K+1 Field Training:

  - S2K+1 Field Training (FAA course #55082) conducted 02/01 through 03/01 at 28 domestic and 1 international facilities. A total of 3024 people (2729 FAA and 295 airline personnel) received the training.
  - Three "Introduction to System Thinking and ATCSCC Operations" (ATCSCC "option A") training courses were conducted at the ATCSCC in 03/01. A total of 71 people (63 FAA, 8 airline) received the training.
  - System Operations Advocacy Training conducted at the ATCSCC: 01/01 – 46 attendees.
  - Leadership Pair Training conducted in two phases: 03/01 through 05/01. Training included Facility Managers, NATCA leadership and Traffic Management Officers from New England Region, Eastern Region, Great

Lakes Region, Southern Region, Kansas City Center, Memphis Center, Houston Center, Minneapolis Center, Denver Center, Albuquerque Center, Salt Lake Center, Seattle Center, Oakland Center, and Los Angeles Center.

  - National Traffic Management Course #50113 throughout 2001: 16 classes held, 420 FAA attendees and 112 Industry attendees.
  - Air Traffic Tactical Operations personnel traveled to field facilities for familiarization: 33 field facilities and 9 airlines operations centers were visited.
  - Field traffic management personnel were funded to visit adjacent facilities and Airline Operations Centers.
  - POET Training Classes held in July, August, and September (90 participants received the training).

- System operations advocacy training. (Remove, Concluded in 2001)
- ATT facility manager, TMU Team training. (Remove, Concluded in 2001)
- Leadership pair training. (Remove, Concluded in 2001)
- Traffic Management Officer Conference scheduled for 1/02
- S2K+2 field training (option B) for FAA and users at various geographic locations.

  A mandatory training package is in development to be trained at all FAA facilities.
- ATCSCC training (option A) for FAA and users at the ATCSCC.
- National Traffic Management Course #50113 for FAA and users at the ATCSCC.

  11 classes scheduled from January-June

  5 classes planned for fall cancelled due to security condition.
- Central Altitude Reservation Course #50114 fro FAA and DOD at the ATCSCC.

  4 classes scheduled
- ATCSCC personnel familiarization visits to field facilities.
- MTO visitations.
- Field traffic management visitations.
- Video development for FAA and user recurrent training programs. (Remove, decision made to incorporate material into the training program)
- Develop revised training package for initial training.

  Revised materials incorporated in Introduction to Traffic Management, FAA course #50113.

- Develop and disseminate revised training materials based on lessons learned for recurring training.

  Training is under development to be available Spring 2002.

- Post Operational Evaluation Tool (POET) training. Post analysis to evaluate events, process, and procedures.

  In addition, post event analysis for feedback and recurrent training is needed to provide information on lessons learned, employing improved techniques and processes.

  Another session is scheduled for fall and this spring.

- Flight Schedule Monitor (FSM) training.

  3 classes scheduled in January to facilitate the expansion of FSM to 27 additional FAA facilities.

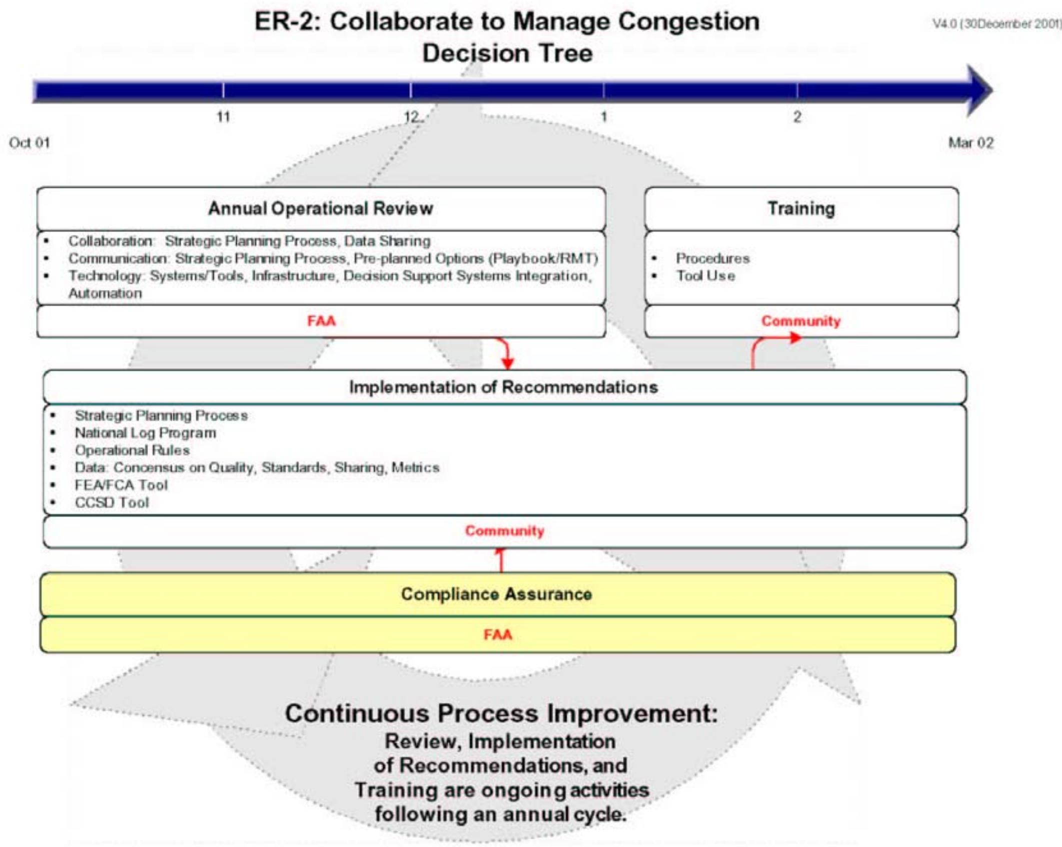
Key Decisions

- Providing resources and ensuring maximum participation for joint FAA/User training.
- Access to data, data standards, data sharing, and common metrics for analysis and feedback.
- Site availability for training due to security condition.

Key Risks

- Resources, both internal and external to the FAA organizations

ER-2 Decision Tree



ER-2 Responsible Team

Primary Office of Delivery
Jack Kies, ATT-1

Support Offices
ASC-1
AUA-700

ER-2 Link To The Architecture

Air Traffic Services / TM-Strategic Flow / Flight Day Management
105201 - Current Flight Day Management

Air Traffic Services / Airspace Management / Airspace Design
108101 - Current Airspace Design

ER-3 Reduce Voice Communication

"Due to recent changes from joint industry/government meetings, this smart sheet is being updated. Expect Version 4.1 by January 31, 2002."

A significant portion of the controller workload is voice communications with the pilots. Application of selective communications services over controller-pilot data link communications reduces the use of en route voice communications. This change frees controller time and makes better use of the voice frequencies resulting in higher sector productivity, and an ability to accommodate the projected growth.

Key Dates

PETAL 2 Trials	2001
CPDLC Build 1 Evaluation at ZMA	2002
CPDLC Build 1A National Deployment Plan	2003

ER-3 Solution Set

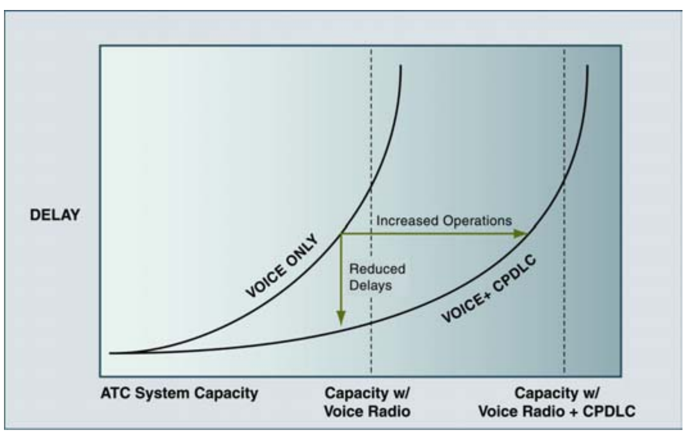
ER-3: Reduce Voice Communication

Reduce flow constraints by reducing voice communications workload.

Benefit, Performance and Metrics

Reduced voice communications workload and distributed communications responsibility combine to provide the following benefits. Note that benefits increase as user equipage increases:

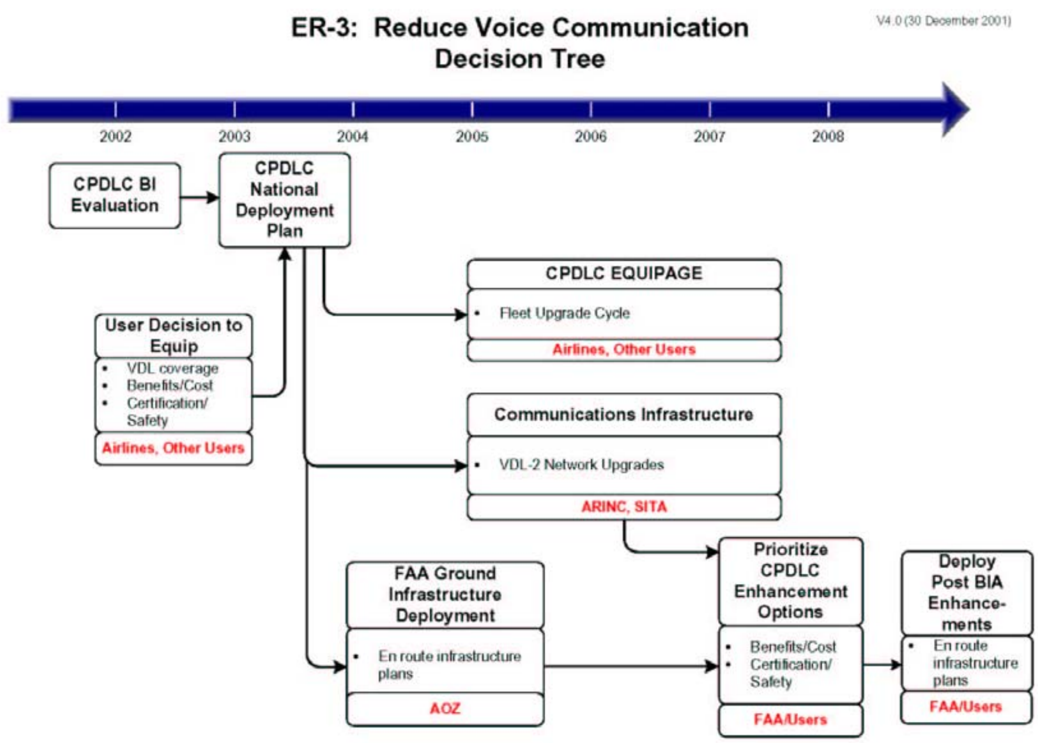
- Enhanced safety reflected by decreased operational errors and increased communications accuracy.
- Increased flight efficiency reflected by less time and fewer miles flown in sector (demonstrated decrease in controller experiment using Atlanta's TIROE arrival sector with a 90% equipage level).
- Increased airspace capacity reflected by increased sector traffic throughput (miles in trail restrictions relaxed in an experimental sector based on voice communication reduction) and reduced delay (see chart below).



FAA, *User Benefits of Two-Way Data Link Air Traffic Control Communications Aircraft Delay and Flight Efficiency in Congested En Route Airspace*.

FAA, *Benefits of Controller-Pilot Data Link ATC Communications in Terminal Airspace.*

ER-3 Decision Tree



ER-3 Responsible Team

Primary Office of Delivery
John Thornton

Support Offices
ATP-1
AUA-200
AIR-100

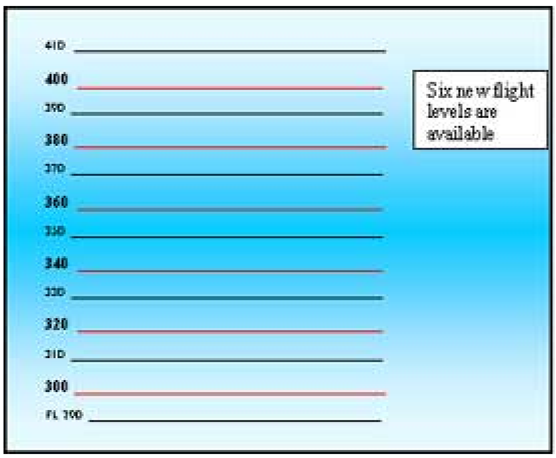
Working Forums
RTCA

Other Websites
RTCA Website
Free Flight Program Office

ER-3 Links To Architecture

Air Traffic Services / ATC-Separation Assurance / Aircraft to Aircraft Separation Capability
102113 - Reduced Routine Workload And Increase Efficiency By Improved Messaging - Demonstration
102114 - Reduced Routine Workload And Increase Efficiency By Improved Messaging - National
102115 - Increased Flexibility And Safety - Strategic Messaging

ER-4 Reduce Vertical Separation



Reducing vertical separation between aircraft can increase the physical capacity of airspace. Demand is highest for cruise altitudes between 26,000 and 41,000 feet (flight levels FL 260 and FL 410). Flights above FL 290 maintain 2000 feet vertical separation, limiting the available cruise range flight levels. By allowing 1,000 ft. vertical separation to be used between FL290-410, RVSM introduces 6 additional flight levels.

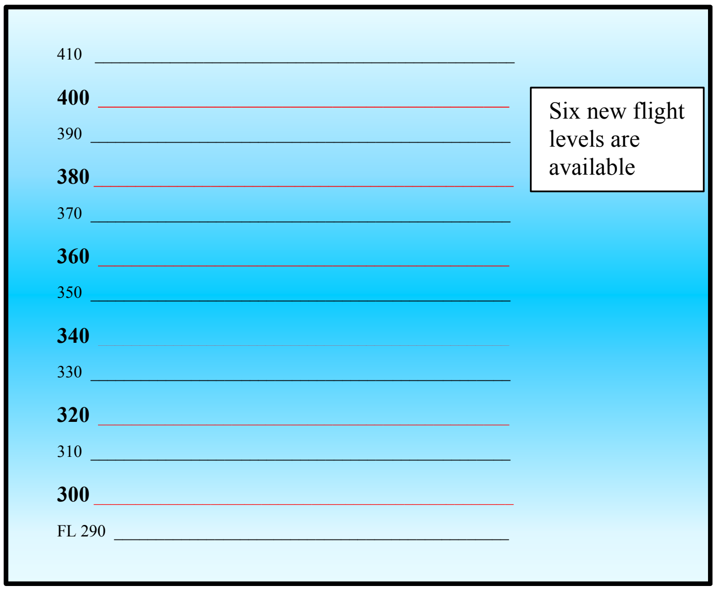
Key Dates

Notice of Proposed Rule Making	April 2002
Rulemaking Final	June 2003
First Phase of Operational Use	2005

ER-4 Solution Set

ER-4: Reduce Vertical Separation Updated ER-4: V4.3 (March 14, 2002)

Reduce vertical separation minima to 1,000 feet for flights operating between 29,000 feet and 41,000 feet.



Background

In US domestic airspace 1,000 foot vertical separation is applied up to FL 290 and 2,000 foot vertical separation is applied above FL 290. The Reduced Vertical Separation Minimum (RVSM) program allows 1,000 foot vertical separation to be applied between FL 290 – 410 (inclusive). RVSM was initially implemented in the North Atlantic (NAT) between FL 330-370 in March 1997. It was implemented in Pacific oceanic airspace between FL 290-390 (inclusive) in February 2000. RVSM is now implemented in the NAT, Europe, the New York Oceanic FIR portion of the West Atlantic Routes System and Australia between FL 290-410 (inclusive). (A map showing RVSM implementation status in individual areas of the world can be viewed on the FAA RVSM website discussed below).

Aircraft that have received RVSM airworthiness approval are eligible to conduct RVSM operations worldwide. The operator, however, must adopt operational policies/procedures specific to individual areas of operation prior to commencing RVSM operations in those areas. Approximately 23% of aircraft that operate in the US above flight level 290 were RVSM approved as of January 2002

The FAA maintains an RVSM website at www.faa.gov/ats/ato/rvsm1.htm. Specific information on FAA RVSM policy/procedures for aircraft and operator approval, air traffic control and monitoring can be found on that website.

Ops Change Description

The objective is to implement RVSM in the vertical stratum of the airspace of the contiguous 48 States of the United States and Alaska and in Gulf of Mexico airspace where the FAA provides air traffic services (Houston and Miami Oceanic Flight Information Regions and Jacksonville Offshore Airspace).

Benefits, Performance and Metrics

- Fuel Burn Savings. Fuel burn savings of approximately 2% per cent for US domestic operations. (When RVSM is implemented between FL 290-410, fuel burn savings are estimated to be approximately $371 million per year for US operators).
- Increased Flight Level Availability. Makes six additional flight levels (for a total of 13) available for operations between FL 290-410. (Current FL orientation schemes applied between FL 290-410 provide seven useable FL's).
- Airspace Capacity. Provides potential increase in sector capacity by enhancing traffic throughput and efficiency within en route airspace.
- Controller Flexibility. Enhances controller flexibility. Provides more options for situations such as weather re-routes and crossing traffic.
- Controller Workload. Reduces controller work load.
- Enhanced Predictability. Enhances predictability of operations be increasing the flight levels available to move aircraft allowing more aircraft to fly at requested flight level.
- Delays. Provides potential to reduce departure delays.

Scope and Applicability

The Domestic Reduced Vertical Separation Minimum (DRVSM) Team has held meetings with user advocate groups and DoD. Such meetings will continue to be scheduled periodically to inform and obtain feedback from users. Also, RVSM seminars will be held to educate users and FAA field offices on RVSM program requirements. (See the FAA RVSM website for seminar announcements and schedule).

- The proposal to implement RVSM between FL 290-410 (inclusive) in December 2004 is considered to be a feasible option and the FAA is developing its plans accordingly.

Key Decisions

- Implementation dates and vertical stratum.
- Policy for accommodation of non-RVSM approved DoD and air ambulance aircraft .

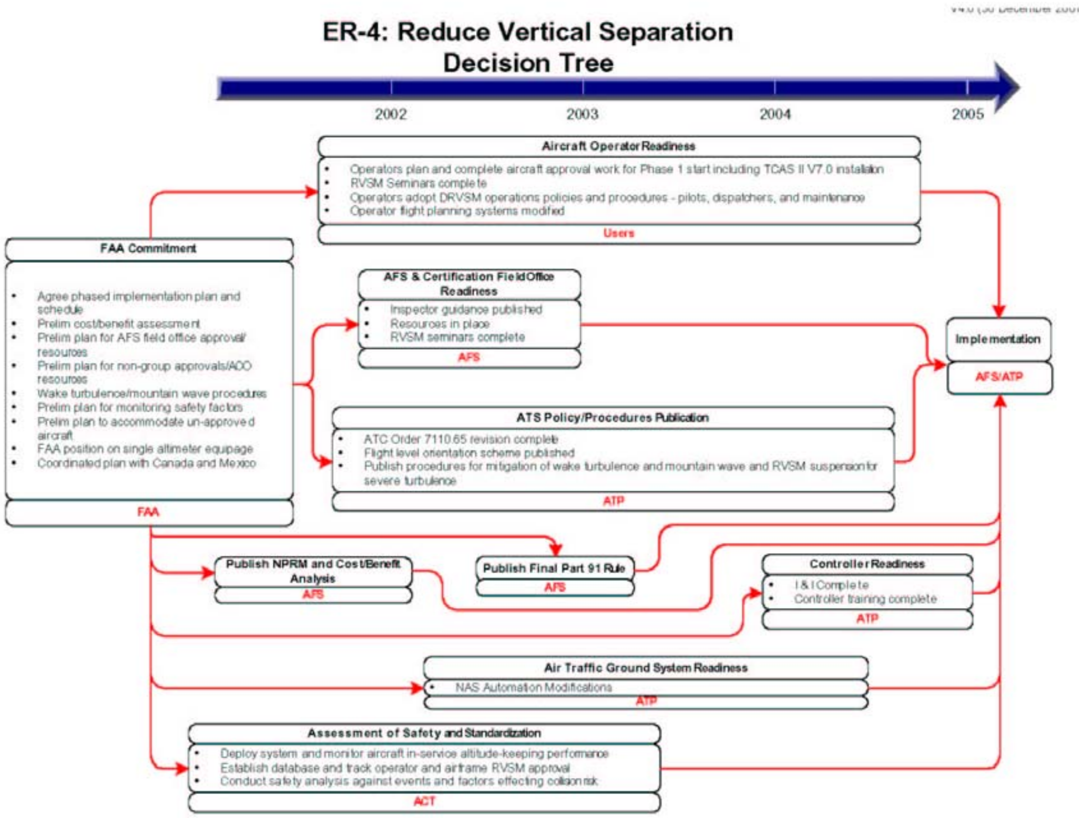
Key Tasks and Risks

- Rulemaking. FAA publication of an NPRM in late April 2002 and a Final Rule in June 2003.
- Cost/Benefit and Implementation Schedule. General user acceptance of an implementation plan and schedule that enables the significant majority of aircraft to be engineered to RVSM compliance. (ATP, AFS).
- Accommodation of Un-Approved Aircraft. Acceptance of policies for accommodation of non-RVSM approved DoD and air ambulance aircraft (ATP, AFS).
- Wake Turbulence/Mountain Wave Effects. Development of procedures to mitigate the effect of wake turbulence and mountain wave effect (ATP, AFS).
- Flight Standards Field Resources. Development of plans for Flight Standards field office approval of large numbers of aircraft and operators (AFS).
- Aircraft Certification Office Resources. Development of plans for Aircraft Certification Office resources to approve individual unique (non-group) airframes for RVSM (AIR, AFS).
- Single Altimeter Equipage. FAA exploring option for turbo-propeller aircraft operated under part 91 and equipped with a single RVSM compliant altimeter to conduct RVSM operations in domestic US airspace and, where authorized, in foreign airspace.

  Note: FAA has established policy to allow DoD aircraft equipped with a single RVSM compliant altimeter to conduct domestic US RVSM operations.
- Coordination with Canada/Mexico. Coordination of implementation plan with Canada and Mexico (ATP, AFS, ACT).
- Safety Analysis. Acceptability of safety analysis to support the DRVSM implementation decision (ATP, AFS, ACT).
- Operator Fleet Readiness. Operators must complete required aircraft and operator approval actions in the period leading up to implementation (AFS, AIR).

- TCAS Version 7.0. Aircraft equipped with TCAS II and used in RVSM operations will be required to equip with TCAS II, Version 7.0 (or a later version) in accordance with the part 91 Appendix G. (TCAS equipage is **not** required for RVSM operations. TCAS equipage requirements are published in regulations not related to RVSM).
- NAS Modification. Modify NAS capabilities such as conflict alert to make them effective at FL's above 290 where 1,000 ft vertical separation is applied. (ATP).
- Pre and Post Implementation Monitoring. Pre- and post implementation monitoring program to assess key factors related to operational safety: data base of approved operators/aircraft; system to monitor aircraft altitude-keeping performance (AFS, ACT).
- Airspace Re-Design. Coordinate DRVSM program with High Altitude Airspace Re-design Program (ATP, ATA).

ER-4 Decision Tree



ER-4 Responsible Team

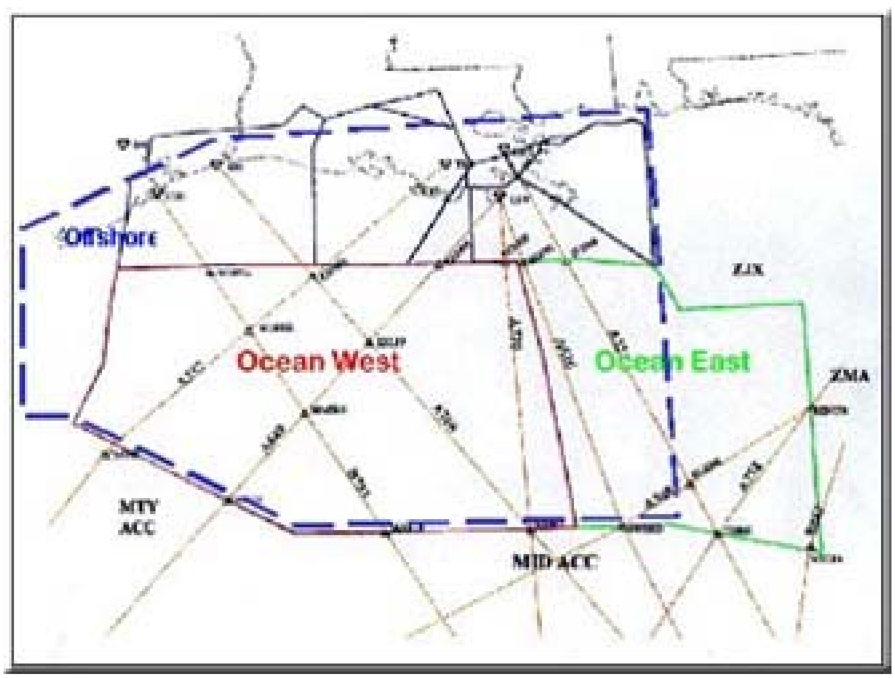
Primary Office of Delivery
James L Ballough
R. Grimes, AFS-400
Lead Specialist: Flight Technologies and
Procedures Division

Support Offices
Avionics System Branch: AIR-130
Enroute Operations / Procedures: ATP-110
NAS & International Airspace Analysis Branch: ACT-520
Automation: AUA-200

ER-4 Links To Architecture

Air Traffic Services / ATC-Separation Assurance / Aircraft to Aircraft Separation Capability
102127 - Increase Vertical Separation Service Above FL350 Domestic Capacity Limited Domain
102128 - Increase Vertical Separation Service Above FL290 Domestic Capacity – National

ER-5 Reduce Offshore Separation



Air traffic between the United States and destinations in the Caribbean, Mexico, and Central America has grown at a rate of over 8% per year over the last 12 years. Currently, flights that transit the Central Gulf of Mexico are subjected to oceanic separation standards in part because of a lack of direct pilot-controller communications, standardized aircraft navigation requirements and limitations to radar surveillance.

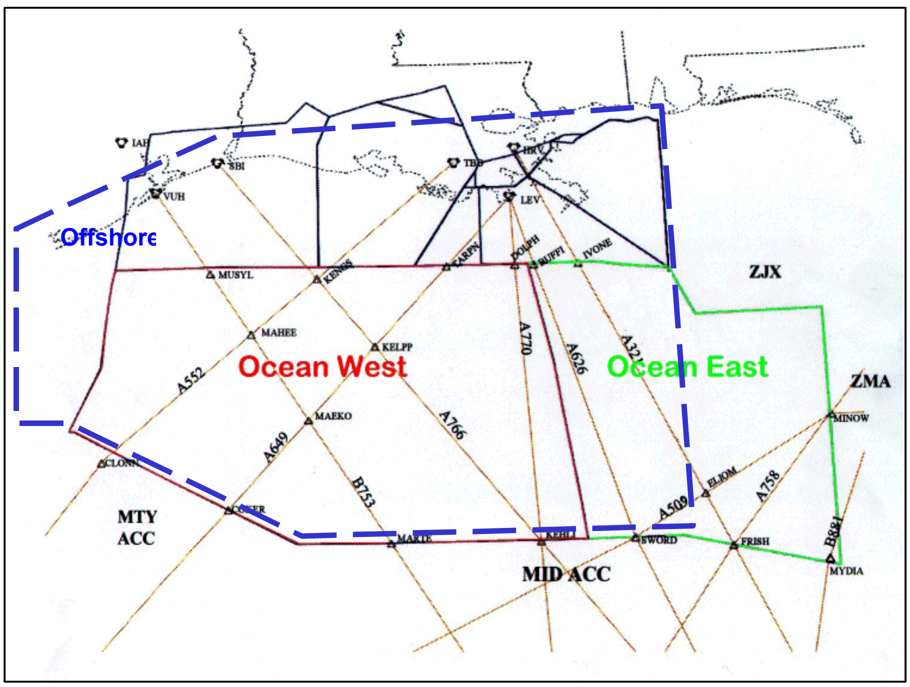
Key Dates

Complete investment analysis to support selection of surveillance system option 2001

Deploy third VHF communications buoy to provide VHF controller-pilot communications down to flight level 180 2002

<u>ER-5 Solution Set</u>

Provide communication, navigation, and surveillance services similar to domestic en route airspace.



Background

Air carrier traffic across the Gulf of Mexico has grown at a historical rate of over 8% over the last 12 years, a rate twice that of domestic airspace. The northern portion of the Gulf is also home to one of the largest helicopter fleets in the world. This fleet of over 600 aircraft provides support for 5500 offshore oil and gas production platforms, an economic engine that contributes 2.5% of the U.S. Gross Domestic Product. Due to a lack of all but the most basic communications, navigation, surveillance, automation, and weather infrastructure, the Gulf presents challenges to the FAA.

In the Gulf of Mexico, there are two major user communities: low altitude offshore operators and high altitude operators.

Gulf of Mexico (GOMEX) Low Altitude Offshore Operations:

GOMEX low altitude offshore airspace is populated primarily by helicopter flights supporting the oil and gas industry. The helicopter fleet consists of over 600 aircraft, which conduct an average of 6,000 flights per day (approximately 2.1 million operations per year) ferrying some 1.8 million passengers per year. These operations are contained in an area 500 miles along the Texas, Louisiana, and Mississippi coasts, extending 125-150 miles into the Gulf. These operations primarily support oil and gas exploration and production in the Gulf of Mexico, activities that account for 2-3% of the U.S. Gross Domestic Product.

The primary operational challenges are a lack of communications and weather reporting capability. The majority of helicopter flights take place between 7,000 feet down and the surface. There are currently 5 RCAG (Remote Communications/Air-Ground) sites located on platforms in the Gulf. These sites, combined with a similar number of onshore sites, provide VHF coverage down to about 4500 feet across the helicopter operations area. The absence of direct pilot/controller communications below 4,500 feet hampers operational efficiency. When IFR conditions are prevalent, capacity is reduced nearly 95%. The oil and gas industry estimates that such a reduction in capacity costs several million dollars per day in lost productivity and overtime.

On IFR days, many operators are forced to cancel flights due to the absence of both en route and destination weather data. Rapidly-forming weather phenomena such as sea fog and temperature inversions can impact the safety of operations because pilots can encounter these conditions with little or no warning while operating on flights that are at or near the aircraft’s maximum range. Adverse weather conditions impact the region an average of one day out of four.

Gulf of Mexico High Altitude Operations:

There are approximately 1,000 high altitude operations per day in the Gulf of Mexico. Flights operating close to shore are covered by one of the many radars ringing the Gulf of Mexico, allowing them to safely operate with smaller, more efficient radar separation standards. However, as one moves deeper into the Gulf, the similarities to domestic airspace end; approximately 300 flights per day transit Gulf oceanic airspace, with the numbers considerably higher during the busy spring and summer travel seasons. As with low altitude offshore airspace, the high altitude en route airspace of the Gulf is impacted by communications, surveillance, and automation deficiencies. Gaps in VHF coverage and lack of surveillance negatively impact capacity by forcing controllers to use larger separation standards between aircraft. Significant VHF communications gaps occur throughout the sector, but mostly at and below FL 290. Approximately 17% of the Gulf traffic operates below that level.

CNS deficiencies force aircraft operators to fly at lower, less efficient altitudes, fly longer routes, or take a delay on the ground. Seasonally, the higher altitudes in the Gulf are subject to severe chop and turbulence, forcing more aircraft down into altitudes without VHF communications, further compounding the capacity problem.

Approximately 40% of aircraft flying in Gulf non-radar airspace are denied requested altitude or route, a figure twice that of similar domestic airspace. Gulf airspace is also home to some of the largest and busiest military training airspace in the world, the presence of which contributes to airspace complexity, and limits FAA's ability to use dynamic flow control.

The absence of automated flight data exchange between the U.S. and Mexico has a direct effect on controller workload; it is estimated that some 35-45% of an oceanic controller's workload is related to manual coordination of flight data.

Gulf traffic has grown at over twice the global average over the last 12 years. In today's environment, the 300+ oceanic operations per day frequently push demand beyond capacity and generate en route or ground delays. If traffic grows as projected, these delays will increase.

Ops Change Description

FAA's goal in the Gulf of Mexico is to introduce the technology enhancements necessary to deliver a higher level of air traffic control service; a level similar to that available over the domestic United States.

<u>Low altitude offshore airspace:</u>

Communications: Direct pilot/controller communications will be enhanced by lowering VHF communications coverage to 1,500 feet throughout the helicopter operating area, with even lower coverage in areas near the VHF sites. FAA's operational service would be improved by allowing controllers to more precisely monitor the position and status of flights, especially during the critical approach, landing, and takeoff phases. With concurrent enhancements in automation, IFR airspace capacity could be increased to levels on par with similar domestic airspace.

Weather: Weather data collection will be enhanced by the installation of remote weather sensors similar to the Automated Surface Observation System (ASOS)/Automated Weather Observation Sites (AWOS) systems currently in use in the domestic U.S. Pilots could then be provided with important "real-time" information like cloud ceilings, visibility, altimeter settings, along with wind speed and direction. This in turn will allow pilots to more effectively plan critical aspects of their flight, such as fuel load, passenger and cargo loads, alternate landing sites, and intermediate stops. FAA's ability to report rapidly developing weather conditions will also be enhanced.

<u>High Altitude En Route Airspace</u>

Communications: Expanding VHF communications in the Gulf of Mexico will allow controllers to more closely monitor and manage the airspace and traffic. Lowering the floor of communications coverage to FL180 across the Houston Oceanic airspace will allow for a reduction in separation standards. Having VHF communications capability down to FL180 will allow air traffic controllers to accommodate significantly more aircraft during periods of severe weather, reducing weather related delays.

Automation: Automation tools will be used to proactively manage both air traffic and airspace complexity. For example, the automated exchange of real-time flight data with Mexico will allow controllers to devote more of their time to separation, safety, and service tasks. Other automation enhancements, such as decision support tools, would also allow controllers to manage the airspace in the safest and most efficient manner.

Surveillance: The use of surveillance in Gulf airspace would mirror its use in the domestic environment, allowing the FAA to safely reduce separation between aircraft from the large and inefficient non-radar standards in use today. Controllers could also provide additional services such as navigational assistance, severe weather avoidance assistance, guidance around potential conflicts, and quick responses to pilot requests for altitude or heading changes. Surveillance also allows for the most dynamic form of Flow Control and Traffic Management.

Navigation: FAA is working to introduce routes and procedures that leverage available technologies and allow our users to harness the potential of satellite based navigation. Navigational enhancements would include the integration of route structures and separation standards that allow FAA's customers to take advantage of their investment in advanced avionics. The proliferation of RNAV/RNP routes, and the associated reductions in separation, will be dictated by the percentage of system users that meet minimum performance standards.

Benefits, Performance and Metrics

- Enhance safety.
- Increase the capacity and efficiency of both the high and low altitude airspace.
- Decrease weather/capacity delays.
- Increase the use of customer preferred flight trajectories.

- With surveillance, aircraft will be allowed to fly more "point-to-point" flights across the central Gulf of Mexico, allow FAA's customers to take advantage of their investment in advanced navigational technology.

- Reduce the impact of severe weather, both in the Gulf and over land in the crowded Texas/Atlanta/Miami triangle.

- Increased capacity means more aircraft from crowded on-shore domestic routes can be "offloaded" on to more direct routes across the Gulf.

- More aircraft will fly their requested altitudes and routes.

- Surveillance will increase security control of the airspace by providing more reliable and accurate aircraft identification and position.

Scope and Applicability

The FAA is progressing on a number of initiatives proposed by the Gulf of Mexico Working Group (GOMWG), a joint FAA/Industry working group, to enhance air traffic management in the area.

<u>Low Altitude/Offshore Initiatives:</u>

<u>Low Altitude Communications and Weather</u>. Low altitude operations in offshore airspace will be enhanced by increasing the number of VHF communications sites in the helicopter operating area. The number of existing RCAG sites must be increased in order to provide needed coverage down to 1,500 feet MSL. Additionally, numerous AWOS must be installed to deliver real-time weather data to controllers and pilots. Current technology allows for the installation of a combined communications/weather package. All of these new packages would be installed on existing oil platforms where power and other support services are typically available. These installations will be performed over a number of years, with several new sites being added each year. An analysis is being conducted to determine the optimum method of obtaining offshore weather data. The analysis is centered on two possibilities: Government-owned and maintained AWOS/ASOS sites vs. some type of private industry weather information service. Both options will be presented to the JRC in FY02 for a final decision. The weather data source selection decision will be made in 2002.

<u>High Altitude En Route Initiatives:</u>

<u>Near-Term (2001-2003)</u>

- <u>High Altitude Communication.</u> The FAA has sponsored the placement of remote VHF transmitter/receivers on a series of buoys in the Gulf. Two prototype buoys have undergone operational testing both dockside and in the central Gulf during the 1999-2001 timeframe. Currently, the FAA is in the production phase, and buoys are being constructed and tested in preparation for deployments planned in FY2002. The combination of the buoys and current onshore systems should allow direct pilot/controller communications down to FL180 across most of the FAA's Gulf airspace. Plans call for production buoys to be deployed, weather permitting, as follows:

- Production Buoy #1……..July 2002
- Production Buoy #2……...July 2002
- Production Buoy #3……...August 2002
- Production Buoy #4 (dockside)……...October 2002

Mid-Term (2003-2007)

- En route automation. Automated flight data transfer between the United States and Mexico will provide controllers with more time for critical safety and separation duties. Mexico and the United States are currently in the initial phases of this work, with enhanced automation capabilities being added over the next few years. Initial automated flight data capabilities with Mexico will begin in 2004.

- RNAV Route Expansion. The FAA has established a program to analyze key safety parameters to determine how the application of RNAV track spacing can be expanded to areas of the Gulf that are not under radar surveillance. Additional RNAV routes implemented in Gulf in 2003.

Long-Term (2007-2010)

- Enhanced Surveillance. The introduction of surveillance into non-radar airspace will enable significant reductions in aircraft separation. An analysis of the applicability of radar for Gulf surveillance is currently underway. The use of the Gulf as a future-systems surveillance test bed is also being explored. Engineering and feasibility studies to identify surveillance options will begin in 2002. Studies related to determination of surveillance infrastructure are considered R&D activities.

These initiatives to enhance CNS capabilities will reduce separation standards, while providing parallel benefits to air traffic flow management and increasing airspace capacity and operating performance.

Key Decisions

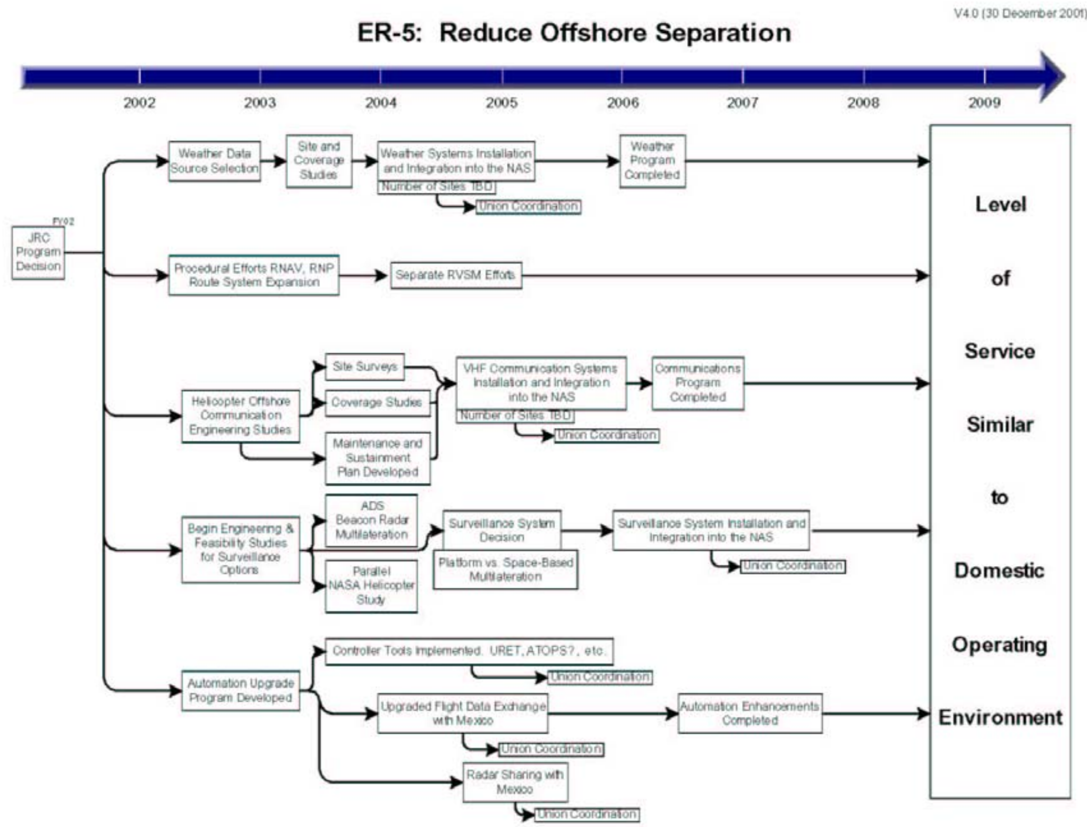
- Determination of the level of service FAA will provide in the Gulf of Mexico.
- Decision regarding program management must be made to ensure program continuity and adequate resource allocation.

- Consensus must be reached that the benefits of Gulf CNS improvements outweigh related operator costs for equipage.
- Immediate funding solution for Gulf programs must be identified.
- Data source for offshore weather information must be identified.
- Based on the results of surveillance analysis and research activities, a decision will be made on how to proceed with surveillance in the Gulf.

Key Risks

- Without formation of SPO/IPT, Gulf initiatives will remain scattered and unfocused.
- Program has no funding baseline, no resources dedicated beyond FY02 buoy funding.
- Effect of severe weather on deployment and maintenance of communications buoys.

ER-5 Decision Tree



ER-5 Responsible Team

Primary Office of Delivery
Mike Cirillo, ATP-1

Support Offices
ATA-1
AUA-200
ASW-500
ASO-500
AFS-400
ATP-100

Working Forums
Gulf of Mexico Work Group

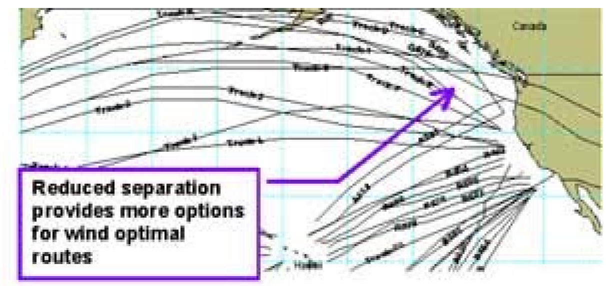
ER-5 Links To Architecture

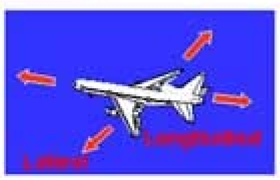
Air Traffic Services / ATC-Separation Assurance / Aircraft to Aircraft Separation Capability

102112 - Current En Route Separation

Air Traffic Services / Airspace Management / Airspace Design
108109 - Increase Capacity And Efficiency Using Satnav To Expand NAS RNAV Routings

ER-6 Reduce Oceanic Separation





Transoceanic flights are confined to airspace based on separation standards that are defined for manual surveillance and unreliable communications. Allowing properly equipped aircraft to operate at reduced oceanic separation will enable more aircraft to fly optimal routes, enhancing aircraft time efficiency in the oceanic leg of their flight. Reduced separation laterally may provide space for additional routes to current destinations or new direct markets. Reduced longitudinal (nose-to-tail) separation will provide more opportunity to add flights without a delay or speed penalty.

Key Dates

ICAO Regional Procedures & Guidance	2003
Determine En-Route Modification	2004
ATOP Build 2 at Oakland Center	2004
Initial Operational Use of 30/30 Separation	2005

ER-6 Solution Set

30 nm lateral and longitudinal (30/30) separation in the ocean.
Background

- *Separation Standards Factors.* Separation standards in a given airspace are a function of the communication, navigation, and surveillance capabilities available in a specific operating environment. Safety analysis and operational judgement consider factors such as: timeliness and reliability of controller-pilot communications, accuracy of aircraft navigation, the controller's ability to determine potential separation loss, aircraft traffic density, and procedures for contingencies such as engine failure and weather deviations.

- *RNP Concept*. The Required Navigation Performance (RNP) concept has been introduced in Pacific operations to standardize navigation. For example, RNP-10 approved aircraft are equipped with navigation systems that can navigate within 10 miles of desired position with 95% probability.
- *Current Separation Standards.* Currently, the minimum lateral separation applied by the FAA is: 120 nm in Atlantic and Caribbean/South American airspace, 60 nm in North Atlantic minimum navigation performance specification airspace, 50 nm between RNP-10 approved aircraft in Pacific airspace except in the Central Pacific where, due to convective weather, 100 nm lateral is applied south of 30N.

  Conventional longitudinal separation is 10 minutes (approximately 80 nm). 50 nm longitudinal separation is currently applied by South Pacific air traffic service providers having enhanced CNS/ATM systems, to aircraft approved for Controller Pilot Data Link Communications (CPDLC) and RNP-10 (10 nm/95% probability).
- *Current Deployment of ADS-A Systems.* Air Traffic Service Providers in New Zealand, Australia, and Tahiti use Automatic Dependent Surveillance-Address (ADS-A) systems in Pacific oceanic airspace. In addition, Fiji plans to deploy an ADS-A system in 2001 and a similar system is under operational testing in Tokyo oceanic airspace.
- *Status of Aircraft System Approvals*. The FAA and other civil aviation authorities have certified ADS-A, CPDLC and RNP capabilities on aircraft such as the B-747-400, B-777 and the A-340.

Ops Change Description

30/30 Separation. The ICAO Separation and Airspace Safety Panel has established standards for the implementation of 30 nm lateral and longitudinal separation that call for: direct controller-pilot communication via voice or datalink, aircraft navigation accuracy to RNP-4 (4 nm/95% probability) and ADS-A capability in the aircraft and at the oceanic center.

FAA ADS-A/ATOP Program. The Advanced Technology and Oceanic Procedures (ATOP) program will deploy ADS-A capability in airspace where the FAA provides oceanic air traffic services. FAA oceanic centers currently offer Controller-Pilot Datalink Communication (CPDLC) service to equipped aircraft.

The ATOP system will enable the application (to properly equipped aircraft) of 50 nm longitudinal separation (extended use) and 30 nm lateral and longitudinal separation. These reduced separation standards will increase oceanic airspace capacity and aircraft time/fuel burn efficiency. ATOP will also improve the safety of oceanic operations by giving controllers enhanced tools to track aircraft progress and identify potential aircraft conflicts and problems.

Benefits, Performance and Metrics

- *Fuel/Time Savings.* Provides equipped users with fuel and time savings, more reliable and optimum routes and greater likelihood of timely granting of requests for clearance changes.
- *Flown as Filed.* Percentage of flights cleared as filed will increase. As a result, fewer altitude change or speed commands are needed because of the pilot's ability to maintain spacing and the smaller separation "bubble" required around each aircraft.
- *Route Efficiency.* The number of routes moved closer to great circle or minimal wind route are expected to increase, resulting in the reduction of fuel load as route reliability increases.
- *Block Time Index.* Lateral reductions have been shown to reduce fuel consumption, which has routinely been taken by carriers in the form of block time savings.
- *Step Climbs.* Increase in user requests granted for procedures such as step climbs.
- *Safety Benefit/Collision Risk Reduction.* Enhanced ATOP surveillance capabilities combined with CPDLC communication enhancement will enable controllers to detect and intervene when aircraft deviate from cleared track or altitude and mitigate the risk of conflict with other aircraft.

Scope and Applicability

- *Enhanced Surveillance in FAA Controlled Oceanic Airspace.* ADS-A will provide enhanced surveillance capability in Oakland, Anchorage, and New York oceanic airspace. ADS-A will enable the FAA to apply 30 nm lateral and longitudinal separation in that airspace.
- *Initial Goals/Dates.* Initial FAA goals are to implement 30 nm lateral and longitudinal (30/30) separation in Oakland controlled South Pacific airspace by 2005. This will be expanded to additional FAA controlled airspace as ADS-A deployment plan progresses and as more aircraft become RNP-4 capable and approved. The introduction of 30/30 into the South Pacific airspace, where Reduced Vertical Separation Minimum (RVSM) has been in use since 2000, will result in that airspace being *the most efficient oceanic airspace in the world.*
- *Aircraft Fleet Equipage.* 30/30 separation and enhanced surveillance will only apply to appropriately equipped aircraft. Aircraft system requirements for 30/30 include CPDLC, RNP-4 approval, and ADS-A.

- *Contingency Procedures.* Contingency procedures will be developed for loss of communications, ADS-A or aircraft RNP-4 capability, aircraft system malfunctions, and weather deviations.

Key Decisions

- *Operator Commitment to Oceanic Datalink.* User community must commit to unified data link evolution.
- *Cost/Safety Benefits.* To increase levels of aircraft equipage, operators must be convinced of cost/benefit and safety enhancements gained by ATOP deployment.
- *Aircraft Fleet Equipage.* To maximize ADS-A benefits, aircraft fleet equipage with CPDLC, RNP-4 and ADS-A capabilities must increase significantly. (Currently approximately 20% of oceanic flights are so equipped.)
- *Plan for Accommodation of Mixed Equipage.* Plan to accommodate aircraft with mixed CNS capabilities for an extended period of time must be developed and accepted.

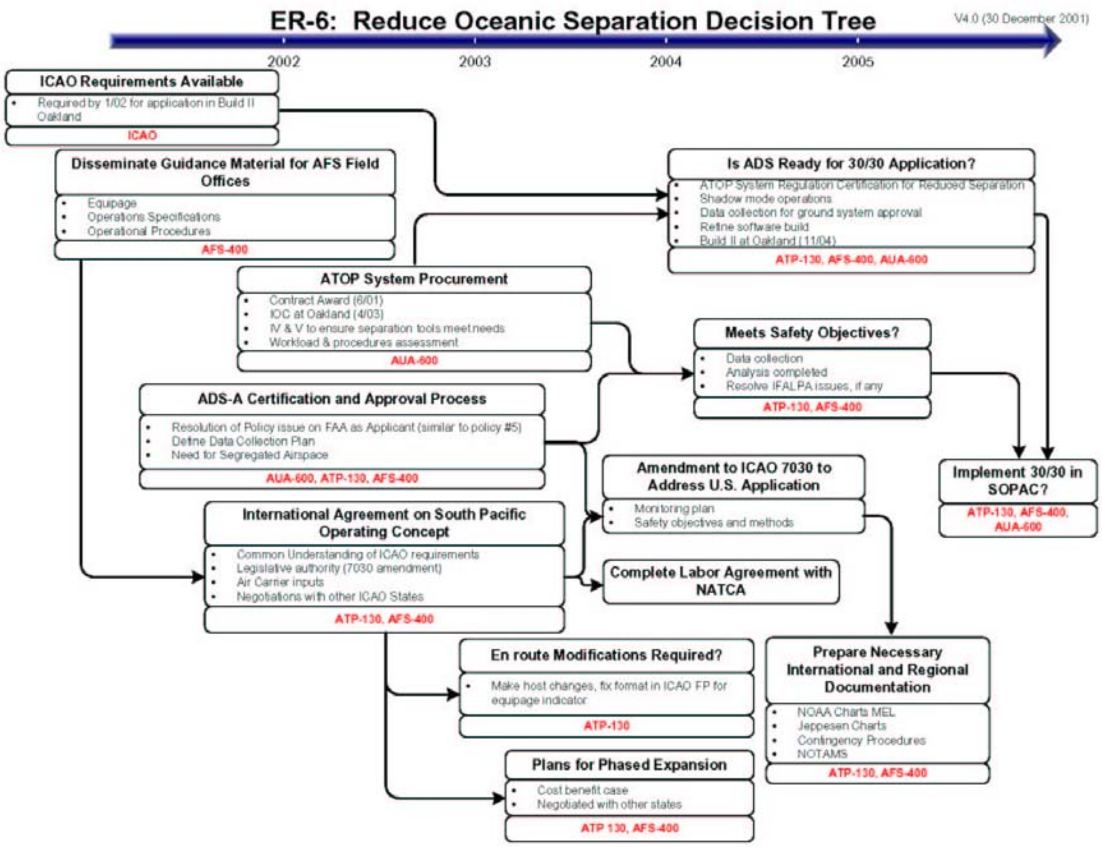
Key Risks

- *ADS-A System Deployment.* ADS-A system must progress without significant delay to IOC and Build II at Oakland ARTCC.

- *ADS-A System Performance.* ADS-A system must perform at prescribed levels of reliability and availability.
- *Staff Resources.* Adequate experience and staffing levels to support national and local procedures development, operator approval, and transition of systems for the separation standards in ocean and remote areas.
- *AFS Resources.* Availability of Flight Standards specialist resource to assess ADS-A system performance and capability to mitigate collision risk and enable aircraft separation reduction.
- *ICAO Requirements.* Final ICAO Requirements for 30/30 application must be available by January 2002 for inclusion in ATOP Build II system requirements.
- *30/30 Implementation Requirements.* Acceptance of adequacy of 30/30 implementation requirements such as safety analysis, ground and aircraft capabilities, and contingency procedures.
- *Operator Commitment to Aircraft Equipage.* Cost/ benefit and safety analysis to advocate fleet advanced CNS equipage beyond current approximate 20% level.
- *Revision of ICAO Regional Policy Documents.* Publication of 30 nm lateral and longitudinal standards in ICAO Asia and Pacific Regional Supplementary Procedures.

- *Aircraft Equipage Mandate*. Long term plan to mandate aircraft equipage with advanced CNS capabilities must be developed.

ER-6 Decision Tree



ER-6 Responsible Team

Primary Office of Delivery
Mike Cirillo, ATP-1

Support Offices
AUA-600
AFS-400
AIR-100

Working Forums
Oceanic Separation Reduction Work Group

Other Websites
http://www.faa.gov/ats/ato/130.htm

ER-6 Link To Architecture

Air Traffic Services / ATC-Separation Assurance / Aircraft to Aircraft Separation Capability
102110 - Increased Horizontal Capacity - 50/50
102111 - Increased Horizontal Capacity - 30/30

ER-7 Accommodate User Preferred Routing

Today, controllers have a view of the airspace that is bounded by the sector that they control. Fixed airspace structures used to organize flows and create predictable intersections are necessary for moment-to-moment control. These structural limitations in some cases result in under utilization of some airspace even as adjacent airspace may be congested. A more strategic look across multiple sectors with conflict detection tools and the flexibility granted the users in the national route program should decrease the concentration of flights. However, in some cases the structure may actually enhance the efficient use of airspace. A careful balance of sufficient, predictable flows and controller look-ahead is required to ensure that flexibility does not simply shift the point of congestion to other sectors.

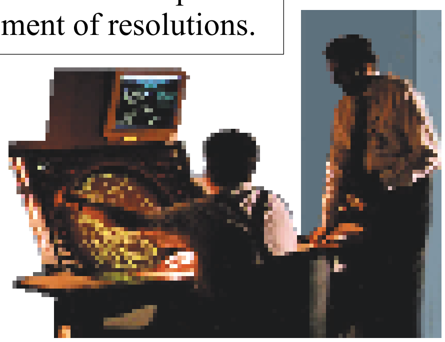
Key Dates

Deploy URET at Seven FFP1 Sites	2002
Comprehensive Revisions to Restrictions (Ongoing)	2003
Begin to Deploy URET at Thirteen Additional Sites	2004
Evaluate PARR/D2/EDA	2004

ER-7 Solution Set

Optimize airspace use by providing decision support tools to controllers.

Strategic planning by controllers makes use of automated prediction of separation conflicts and assessment of resolutions.



Controllers manage assigned meter times with the use of automation projections.

Options for conflict resolution are provided for controller consideration and decisions.

Background

Today, controllers have a view of the airspace that is bounded by the sectors for which they have jurisdiction. This view limits the options available to the controller to solve problems. In addition, a fixed route structure is used to organize the airspace, providing controllers with predictable points where conflicts may arise. This fixed route structure allows controllers to maintain a three-dimensional view of the traffic situation. In some cases, however, this results in aircraft being separated from airspace. In the current environment, flow constraints (e.g., Miles-in-Trail restrictions, ground delay programs, re-routes) are used to avoid situations where the number of aircraft being controlled by an en route sector controller is beyond the controller's ability to provide separation services. This also results in the users being constrained in their choice of flight paths.

Ops Change Description

By providing Air Traffic Management decision support capabilities to the sector, controllers are able to see beyond their own sector boundaries, allowing some restrictions to be removed, increasing the options to solve problems as well as increasing the likelihood that more efficient services can be provided. This will be accomplished through the addition of strategic management tools that complement the tactical control techniques used to maintain safety. These strategic tools provide advisory information about routes and/or altitude options that can avoid conflicts and weather situations. The specific decision support capabilities are:

- ER-7.1: *Conflict Identification and Planning*, which assists controllers in the prediction of aircraft-aircraft and aircraft-airspace conflicts and which has capabilities for controllers to construct and assess alternatives. The User Request Evaluation Tool (URET), being developed and deployed under Free Flight Phase 1 and 2, will provide these capabilities.
- ER-7.2: *Metering and Merge Planning*, which provides a metering plan to TMCs and provides information to controllers to quantify the differences between assigned meter times and the times that aircraft are projected to cross a meter fix. The Traffic Management Advisor (TMA), being developed and deployed under Free Flight Phase 1 and 2, will provide these capabilities at some locations. An enhanced version of TMA, which can be used at additional locations, is currently in research.
- ER-7.3: *Conflict Resolution and Planning Aids*, which are used by controllers to generate proposed solutions to aircraft-aircraft and aircraft-airspace conflicts and to identify instances where a more direct route will result in user savings. A resolution capability - Problem Analysis, Resolution, and Ranking (PARR) and a direct routing aid - Direct-to (D2) are currently being researched.

From the user perspective these capabilities will support their ability to fly routes that are defined by points in the airspace (latitude/longitude/altitude), with fewer restrictions caused by the structure of the airspace.

Benefit, Performance and Metrics

- Reduction in static airspace restrictions.
- The total miles flown through a center will decrease.
- Hourly flow by ARTCC and Sector will be increased.
- Fewer low-altitude holds will be invoked.
- Fly as filed percentage (including altitude) will increase.
- User-requested re-route percentage being granted will increase.

ER-7.1 Conflict Identification and Planning

Decision support tools assist the controller in detecting conflicts and assessing potential changes to the aircraft's path.

Scope and Applicability

- URET can be applied to all en route airspace. The benefits URET provides depend on the traffic levels and complexity that sector controllers have to deal with. For greatest benefit, URET should be available in contiguous airspace.

- By the end of FY 02, FFP1 introduces URET to five additional centers (Cleveland, Chicago, Kansas City, Washington and Atlanta) and replaces the prototype at Memphis and Indianapolis Centers.
- Long-Term: FFP2 will expand URET to Minneapolis, Denver, Albuquerque, Fort Worth, Jacksonville, New York, Houston, Boston, Miami, Salt Lake City, Seattle, Oakland and Los Angeles centers. The FFP2 program office has not established URET schedules, but the deployments will be complete prior to 2005, with initial daily use at four sites in FY 03 and nine sites in FY 04.

Key Decisions

- None identified.

Key Risks

- None identified.

ER-7.2 Metering and Merge Planning

Decision support tools provide the TMC with a metering plan and the controller with information on the required delays for each aircraft (also see AD-4.2).

Scope and Applicability

- TMA (Traffic Management Advisor) is applicable for airports where arrival demand regularly exceeds capacity.
- TMA-SC (Traffic Management Advisor – Single Center) near-term and mid-term locations include: ZFW-DFW (complete), ZMP-MSP (complete), ZDV-DEN (complete), ZMA-MIA (complete), ZOA –SFO (complete), ZLA-LAX (complete), and ZTL-ATL (complete).
- Additional arrival sites will require site specific adaptation. FFP2 plans to deploy TMA-SC to support arrivals at the following airports: ZME-MEM, ZKC-STL, ZID-CVG, and ZHU-IAH. Deployment order and schedule have not been finalized, but the current plan is to deploy to 1 site in FY 03, 2 sites in FY04, and 1 site in FY 05. Expansion to additional sites may include supporting arrivals to MCO, CLT, SEA, SLC, PHX, BOS, and LAS.
- TMA-MC (Traffic Management Advisor – Multi Center) will enhance TMA to work in areas where the airport is close to the center boundaries and where arrival flows interact with flows to other airports. RTCA recommended TMA for several sites that require TMA-MC capability, these include Washington area airports, N90 airports, PHL, DTW, SDF, BOS, and PIT. NASA is developing TMA-MC with emphasis on PHL airspace; this capability should be ready for evaluation in FY 03.

Key Decisions

- Priorities for TMA deployments beyond the current recommendation

Key Risks

- NASA is currently researching TMA-MC. Implementation is dependent on the success of this research and on NASA participation in technology transition.
- New York and Philadelphia redesign activities will result in changes to TMA adaptation and therefore work in these areas needs to be coordinated.

ER-7.3 Conflict Resolution and Planning Aids

Decision support tools will assist the controller's ability to resolve conflicts and to generate direct routes.

Scope and Applicability

- En route conflict resolution aids expand on the conflict probe capability provided by URET CCLD.
- Research is currently underway on a direct-to tool that identify instances where a more direct route will result in user savings and on conflict resolution aids that assist the controller in generating solutions. These capabilities should undergo full scale evaluation in FY02-04. A spiral development approach will allow some capabilities to be implemented early.

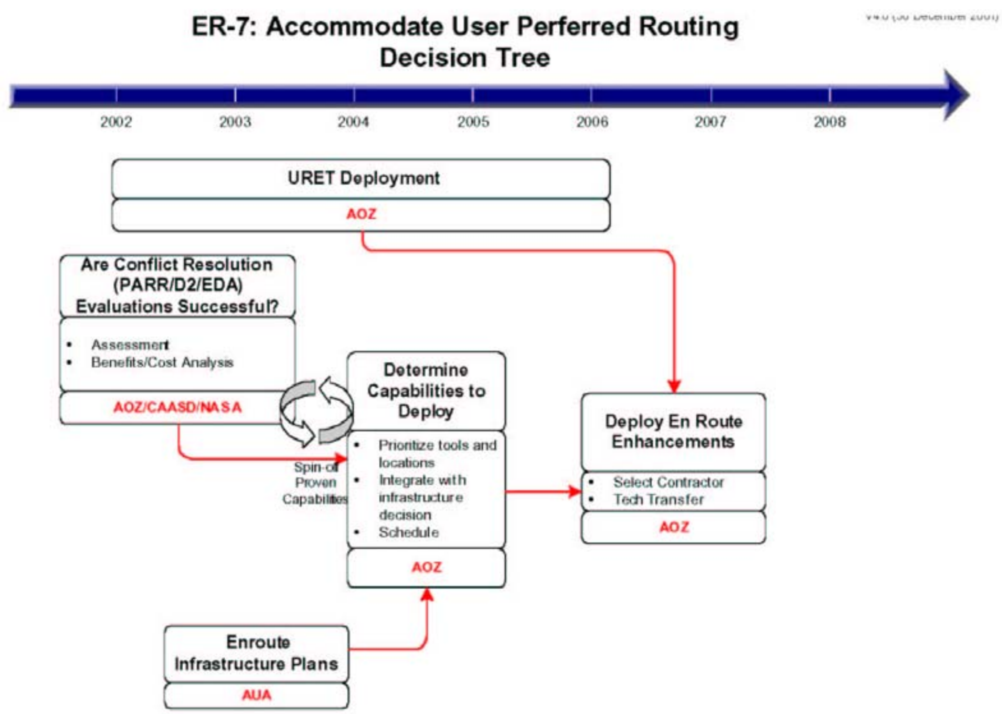
Key Decisions

- None identified.

Key Risks

- MITRE/CAASD is currently researching conflict resolution aids (PARR - Problem Analysis, Resolution, and Ranking). Implementation is dependent on the success of this research and on CAASD participation in technology transition.
- NASA is currently researching a direct-to (D-2) capability. Implementation is dependent on the success of this research and on NASA participation in technology transition.

ER-7 Decision Tree



ER-7 Responsible Team

Primary Office of Delivery
John Thornton

Support Offices
ATP-1
AUA-200

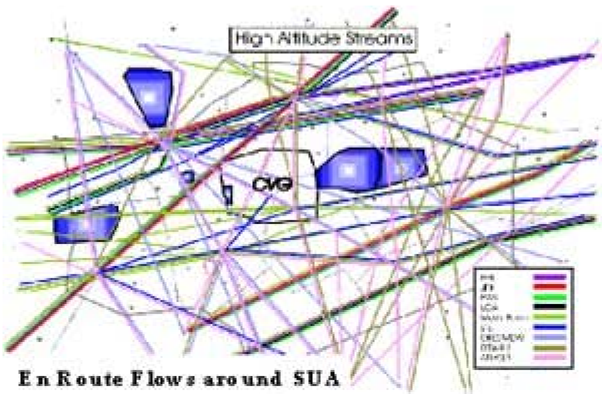
Working Forums
RTCA
Interagency IPT

Other Websites
[RTCA Website]
[Free Flight Program Office]

ER-7 Links To Architecture

Air Traffic Services / TM-Synchronization / Airborne Traffic Synchronization
104104 - URET CCLD (FFP1)
104105 - Conflict Probe
104107 - Direct-To-Routing (NASA Demo)
104116 - Traffic Management Advisor - Single Center (FFP1)
104117 - National Traffic Management Advisor - Single Center
104118 - Traffic Management Advisor - Multi-Center (NASA Demo)
104119 - National Traffic Management Advisor - Multi-Center

ER-8 Improve Access to Special Use Airspace (SUA)



The availability of special use airspace (primarily airspace reserved for military use) is often not known in time to be of any value as an alternative route for civilian flights. More effective distribution of this information to service providers, pilots and air carriers will increase the practical use of this airspace as a means to avoid congested areas. Negotiation among the stakeholders and trials of standing plans for access to specific areas such as the Buckeye military area and the Virginia Capes area are underway.

Key Dates

New VASAPES SWAP Area Deployment of SUA/ISE Hardware & Software 2002

ER-8 Solution Set

Improve the efficiencies in which civil aviation is routed through special-use airspace, while providing availability and flexibility to military users.

Background

Information on the availability of special use airspace (SUA) for civilian flights is often not timely or is limited to unrealistic announcements on availability. Timely schedules for the SUA and dynamic use of the SUA information will result in enhanced route flexibility. The FAA, military, and civilian users are exploring methods of sharing information about SUA schedules and utilization to afford increased civilian access.

Ops Change Description

The operational change involves procedures to provide more effective distribution of SUA information to service providers, pilots, and other airspace users. The information will foster collaboration among stakeholders and increase flexibility and access. Decision support tools will improve information processing, planning, scheduling, and routing that will provide dynamic use of special-use airspace when available and appropriate.

Benefits, Performance and Metrics

- Improve flight efficiency and reduced flight-leg length when authorized to transit the airspace.
- Reduce the coordination processing time and improve availability of SUA on a near real-time basis.
- Enhance information systems accessibility to all users of the NAS.

Scope and Applicability

Near-Term:

- The FAA, military, and civilian users are exploring methods of sharing information about SUA schedules and utilization to afford increased civilian access. These include Special Use Airspace Management System (SAMS) and Special Use Airspace In-flight Service Enhancement (SUA/ISE). Two operational trials have been undertaken in Florida and Texas to evaluate these proposed collaborative actions. The Florida trial was successfully completed in August 2001. The Texas trial is being developed around several SUA tools to provide near, real-time information on the operational status of the subject airspace. The testing will take place from Ft. Worth Flight Service Station (FSS) with participation from American Eagle and Atlantic Southeast airlines, as well as Texas State Technical College. The test will merge SUA/ISE, SAMS, and Enhanced Traffic Management System (ETMS) through a web-based server at MITRE that will be made available on the Internet for the flying participants. The testing should begin early 2002.

- FAA is also developing the SUA/ISE System to provide near-real time SUA activity information to FSS, en route centers and the ATCSCC on a graphic display, which includes weather and geographical information. The deployment of hardware and software should be completed by August 2002.

- FAA is working with the military concerning several pieces of SUA and obtaining more real-time access. Each of these efforts is being pursued with the military on a case-by-case basis. The Buckeye MOA working group started bi-monthly meetings in June 2001 to facilitate this process.

- FAA and the US Navy have established a Letter of Agreement (LOA) that resulted in Severe Weather Avoidance Procedures (SWAP) Waypoints being developed for the 2001 season. The area encompasses airspace that contains Warning Areas controlled by Fleet Area Control and Surveillance Facility (FACSFAC) VACAPES. The working group, which includes representatives from various FAA air traffic offices, and the National Air Traffic Controllers Association (NATCA), is now determining procedures for the offshore area of the U.S. East Coast to be completed in April 2002.

- FAA started developing The Falcon View automation system in January of 2001 to provide an automated platform to accurately coordinate SUA information between DoD and FAA. The testing program and operational procedures will be completed by October 2002.

Mid-Term:

- FAA is continuing to use and evolve the FAA Military Operations Network (MILOPS NET), and continue the interface development between SAMS and Military Airspace Management System (MAMS). These systems will be able to provide SUA scheduling information to all en route centers and the ATCSCC.

- FAA and the US Navy will continue annual establishment of SWAP Waypoints for an offshore area of the U.S. East Coast.

- The Falcon View automation software development and testing will continue.

Key Decisions

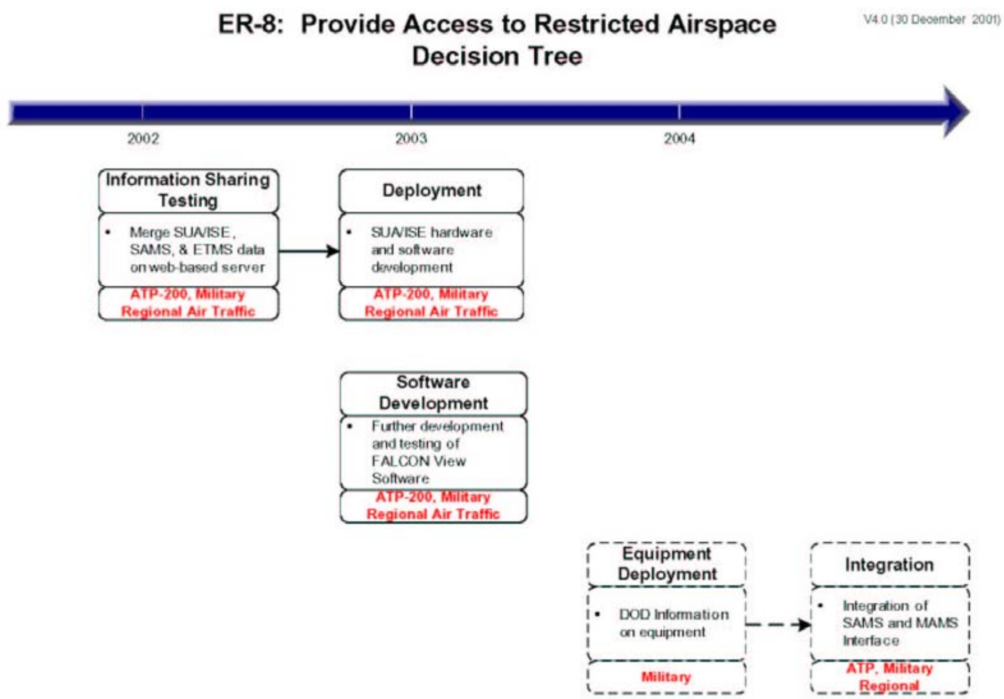
- Procedures for sharing SUA availability information have been and will continue to be developed, based on the recommendations from RTCA Special Committee 192 operational trials. The military and FAA are determining the process for improving public dissemination of the information (e.g. improving use with the FAA MILOPS NET).

- Whether to expand the MILOPS NET, a computer system with the ability to house the software packages of SAMS, Central Altitude Reservation Facility (CARF), and NOTAMS, to interface with other computer system, such as MAMS.

Key Risks

- Defining procedures for sharing SUA availability information.
- Ensuring the military can meet its new mission requirements under the Homeland Security criteria.
- Lack of defined improvements or upgrades to automation systems to support SUA processing, and planning in the future.
- SAMS and MAMS interface.
- Sustainability of SAMS and other supporting automation systems.
- Interoperability of SUA information sharing tools and other automation capabilities.
- Improvements or upgrades to automation systems to support near real-time SUA information processing, planning, scheduling, and routing.
- SUA ISE deployment for each AFSS.
- Funding for Communication Network for SUA/ISE.

ER-8 Decision Tree



ER-8 Responsible Team

Primary Office of Delivery
Mike Cirillo, ATP-1

Support Offices
ATA-1

ER-8 Links To Architecture

http://www.nas-architecture.faa.gov/CATSI.cfm?OEP_ID=ER-8